

## Procedures Guide

# hp StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Failover/Failback

**Product Version:** ACS Version 8.7P

Fifth Edition (March 2004)

**Part Number:** AA-RPJ0E-TE

This Procedures Guide provides a general description of HP StorageWorks Data Replication Manager and introduces the concepts of failover and failback. It provides specific and detailed procedures for performing failover and failback, and for resuming operations after special situations. Troubleshooting help is also provided for failover and failback issues.

For the latest version of this guide and other Data Replication Manager documentation, access the website at <http://h18000.www1.hp.com/products/sanworks/drm/index.html>. Click the **technical documentation** link and the technical support page is displayed. Click **manuals (guides, supplements, addendums, etc)** for a listing of related documentation.



© Copyright 2000–2004 Hewlett-Packard Development Company, L.P.

Hewlett-Packard Company makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

This document contains proprietary information, which is protected by copyright. No part of this document may be photocopied, reproduced, or translated into another language without the prior written consent of Hewlett-Packard. The information contained in this document is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Microsoft®, MS Windows®, Windows®, and Windows NT® are U.S. registered trademarks of Microsoft Corporation.

UNIX® is a registered trademark of The Open Group.

Hewlett-Packard Company shall not be liable for technical or editorial errors or omissions contained herein. The information is provided “as is” without warranty of any kind and is subject to change without notice. The warranties for Hewlett-Packard Company products are set forth in the express limited warranty statements for such products. Nothing herein should be construed as constituting an additional warranty.

Data Replication Manager HSG80 ACS Version 8.7P Failover/Failback Procedures Guide  
Fifth Edition (March 2004)  
Part Number: AA–RPJOE–TE

# contents

<b>About this Guide.</b>	<b>7</b>
Overview.	8
Intended Audience	8
Related Documentation	8
Conventions	8
Document Conventions	9
Text Symbols	9
Equipment Symbols	10
Rack Stability	11
Getting Help	12
HP Technical Support	12
HP Storage Web Site	12
HP Authorized Reseller	12
<b>1 Introduction to Failover/Failback.</b>	<b>13</b>
Data Replication Manager Overview	14
Peer-to-Peer Remote Copy Function	14
Hardware Redundancy	14
Failover and Failback	14
Failover	15
Failback	17
Failsafe-Locked and Normal Modes	17
Possible Event Scenarios	18
Unplanned Site Failover with Full Failback	18
Unplanned Loss of Target While in Failsafe Mode	18
Unplanned Loss of Target While in Normal Mode	18
Short Duration Initiator Site Maintenance	18
Resumption of Replication After Short Planned Loss of Target	19
Extended Duration Initiator Site Maintenance	19
Resumption of Replication After Extended Planned Loss of Target	19
Unplanned Site Failover Due to Disaster at Initiator	19
Planned Role Reversal	19
Summary of Procedure Choices	20
Planned System Power-Up or Power-Down	21
Using Scripts to Automate Failover and Failback Procedures	21
Overview	21
Requirements	21

How Scripts Work .....	21
<b>2 Unplanned Site Failover with Full Failback Procedure .....</b>	<b>23</b>
Unplanned Failover .....	24
Target Site Failover Procedure .....	24
Full Failback .....	32
Initiator Site Preparation Procedure .....	32
Target Site Copy Data Procedure .....	35
Initiator Site Return Control Procedure .....	39
Target Site Restore Procedure .....	40
Initiator Site Restoration of Target Connections Procedure .....	41
<b>3 Resumption of Operations After Unplanned Loss of Target Site Procedure (Failsafe Mode) .....</b>	<b>47</b>
Verification of Lost Connections Procedure .....	48
Resumption of Host Access to Remote Copy Sets Procedure .....	49
Resumption of Operations and Return to Failsafe Mode Procedure .....	50
<b>4 Resumption of Operations After Unplanned Loss of Target Site Procedure (Normal Mode) .....</b>	<b>53</b>
Verification of Lost Connections Procedure .....	54
Resumption of Host Access to Remote Copy Sets Procedure .....	54
Verification of Resumption of Operations Procedure .....	55
<b>5 Short Planned Site Failover with Fast Failback Procedure .....</b>	<b>59</b>
Power-Up and Power-Down .....	60
Planned Site Failover .....	60
Initiator Site Preparation Procedure .....	60
Target Site Failover Procedure .....	63
Create a Log Unit .....	66
Create Association Sets and Assign a Log Unit .....	67
Target Host Setup Procedure .....	68
Fast Failback .....	75
Target Site Failback Procedure .....	75
Initiator Site Cleanup Procedure .....	77
<b>6 Resumption of Replication After Short Planned Loss of Target Procedure .....</b>	<b>81</b>
Procedure for Planned Loss of Target During Short Maintenance Period .....	82
Suspend Remote Copy Sets for Target Site Shutdown .....	82
Target Site Shutdown .....	86
Resume Remote Copy Sets When Target Site Is Back Up .....	86
<b>7 Extended Planned Site Failover with Full Failback Procedure .....</b>	<b>89</b>
Planned Site Failover .....	90
Initiator Site Preparation Procedure .....	90
Target Site Failover Procedure .....	93
Target Host Setup Procedure .....	97
Maintenance Completion .....	101
Initiator Site Preparation Procedure .....	101
Target Site Copy Data Procedure .....	103
Maintenance Failback .....	105

Continuation of Target Site Copy Data Procedure . . . . .	105
Initiator Site Return Control Procedure . . . . .	106
Target Site Restore Procedure . . . . .	107
Initiator Site Restoration of Target Connections Procedure . . . . .	108
<b>8 Resumption of Replication After Extended Planned Loss of Target Procedure (Failsafe Mode) . . . . .</b>	<b>115</b>
Prepare Remote Copy Sets . . . . .	116
Target Site Availability . . . . .	117
Resume Remote Copy Set Operation . . . . .	117
<b>9 Unplanned Site Failover with Failback to New Hardware Procedure . . . . .</b>	<b>121</b>
Unplanned Failover . . . . .	122
Target Site Failover Procedure . . . . .	122
New Hardware Failback . . . . .	132
Initiator Site Preparation Procedure . . . . .	132
Target Site Preparation Procedure . . . . .	139
Initiator Site Connections Procedure . . . . .	143
Target Site Copy Data Procedure . . . . .	144
Initiator Site Return Control Procedure . . . . .	147
Target Site Restore Procedure . . . . .	149
Initiator Site Restoration of Target Connections Procedure . . . . .	151
<b>10 Planned Site Role Reversal Procedure . . . . .</b>	<b>157</b>
Role Reversal Failover . . . . .	158
Initiator Site Preparation Procedure . . . . .	158
Target Site Failover Procedure . . . . .	161
Target Host Setup Procedure . . . . .	165
Role Reversal Failback . . . . .	170
Target Site Failback Procedure . . . . .	170
Initiator Site Cleanup Procedure . . . . .	171
<b>11 Troubleshooting . . . . .</b>	<b>175</b>
HSG80 Array Controller Operating Characteristics . . . . .	176
Forced Errors Detected During Copy . . . . .	176
Read Errors Detected During Full Copy . . . . .	176
Dual Redundancy During Failback . . . . .	176
Failsafe Lock Management . . . . .	176
Link Failure Management . . . . .	177
Remote Copy Set Member Failures . . . . .	177
Remote Copy Set World Wide LUN ID . . . . .	177
Write History Logging . . . . .	177
Component Failures . . . . .	177
Failure Notification . . . . .	178
SWCC Failure . . . . .	178
Failure of One Member in a Dual-Redundant Controller Pair . . . . .	178
Failure Modes of a DT System in Normal Operation . . . . .	179
Failure at Target Site After Failover . . . . .	180
Confirmation Message Instance Codes . . . . .	181

<b>A</b>	<b>Status Comparison</b>	<b>183</b>
	Target Site Terminal Emulator Session	183
	Issuing SHOW Commands	184
<b>B</b>	<b>DRM Power-Up and Power-Down</b>	<b>187</b>
	Power-Up Data Replication Manager Systems	187
	Target Site Power-Up Procedure	187
	Initiator Site Power-Up Procedure	187
	Power Down DRM Systems	188
	Initiator Site Power-Down Procedure	188
	Target Site Power-Down Procedure	188
<b>C</b>	<b>Creating a Log Unit and Association Sets</b>	<b>189</b>
	Create a Log Unit	189
	Create Association Sets and Assign a Log Unit	190
	<b>Glossary</b>	<b>193</b>
	<b>Index</b>	<b>207</b>
	<b>Figures</b>	
1	Basic Data Replication Manager configuration	15
	<b>Tables</b>	
1	Document conventions	9
2	When and When Not to Failover	16
3	Procedure Choices	20
4	Failure Modes of a DT System with Normal Operation	179
5	Target Site DT Failure Modes After Failover	180
6	Instance Code Legend	181

## About This Guide

This failover/failback procedures guide provides information to help you:

- Understand basic Data Replication Manager failover and failback concepts.
- Determine when a failover is the appropriate action.
- Determine which failover/failback procedure is the right action for your current situation.
- Perform the actual failover and failback procedures.
- Contact technical support for additional assistance.

This procedures guide contains minor edits since the last edition, consisting mostly of changes in links and references, and was also reformatted to meet newer company standards.

“About this Guide” topics include:

- [Overview](#), page 8
- [Conventions](#), page 8
- [Rack Stability](#), page 11
- [Getting Help](#), page 12

## Overview

This section covers the following topics:

- [Intended Audience](#)
- [Related Documentation](#)

## Intended Audience

This book is intended for use by system administrators who are experienced with the following:

- HP StorageWorks ACS Version 8.7P for their Data Replication Manager (DRM) storage system.
- Administration of the various operating systems used by the hosts in their heterogeneous SAN.

## Related Documentation

In addition to this guide, HP provides additional information you may need to reference when connecting, configuring, and operating your DRM solution:

- *HP StorageWorks Data Replication Manager HSG80 Version 8.7P Configuration Guide*, part number AA-RPHZF-TE
- *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Release Notes*, part number AA-RPJ2E-TE
- *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Scripting User Guide*, part number EK-DRMSC-OA. E01
- *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Design Guide Application Notes*, part number AA-RQ78C-TE
- *HP StorageWorks SAN Design Reference Guide*, part number AA-RMPNL-TE

## Conventions

Conventions consist of the following:

- [Document Conventions](#)
- [Text Symbols](#)
- [Equipment Symbols](#)



## Document Conventions

This document follows the conventions in [Table 1](#).

**Table 1: Document conventions**

Convention	Element
Blue text: <a href="#">Figure 1</a>	Cross-reference links
<b>Bold</b>	Menu items, buttons, and key, tab, and box names
<i>Italics</i>	Text emphasis and document titles in body text
Monospace font	User input, commands, code, file and directory names, and system responses (output and messages)
<i>Monospace, italic font</i>	Command-line and code variables
Blue underlined sans serif font text ( <a href="http://www.hp.com">http://www.hp.com</a> )	Web site addresses

## Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings:



**WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.



**Caution:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

**Tip:** Text in a tip provides additional help to readers by providing nonessential or optional techniques, procedures, or shortcuts.

**Note:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

► Identifies a procedural step to be performed at the initiator site.

⊙ Identifies a procedural step to be performed at the target site.

## Equipment Symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings:



Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

**WARNING:** To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.

---



Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

**WARNING:** To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

---



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

**WARNING:** To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.

---



Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

**WARNING:** To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

---



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

**WARNING:** To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

---

## Rack Stability

Rack stability protects personnel and equipment.



**WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
  - The full weight of the rack rests on the leveling jacks.
  - In single rack installations, the stabilizing feet are attached to the rack.
  - In multiple rack installations, the racks are coupled.
  - Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.
-

## Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our web site: <http://www.hp.com>.

## HP Technical Support

Telephone numbers for worldwide technical support are listed on the following HP web site: <http://www.hp.com/support/>. From this web site, select the country of origin.

---

**Note:** For continuous quality improvement, calls may be recorded or monitored.

---

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

## HP Storage Web Site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: <http://www.hp.com/country/us/eng/prodserv/storage.html>. From this web site, select the appropriate product or solution.

## HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP web site for locations and telephone numbers: <http://www.hp.com>.

# Introduction to Failover/Failback

# 1

This chapter provides a general description of HP StorageWorks Data Replication Manager (DRM) and introduces the concepts of failover and failback. It also discusses process resumption options for special circumstances and provides a decision logic table to guide you in selecting the appropriate failover/failback or process continuation procedure for your current situation.

This chapter covers the following topics:

- [Data Replication Manager Overview](#), page 14
  - [Peer-to-Peer Remote Copy Function](#), page 14
  - [Hardware Redundancy](#), page 14
- [Failover and Failback](#), page 14
  - [Failover](#), page 15
  - [Failback](#), page 17
  - [Failsafe-Locked and Normal Modes](#), page 17
- [Possible Event Scenarios](#), page 18
- [Planned System Power-Up or Power-Down](#), page 21
- [Using Scripts to Automate Failover and Failback Procedures](#), page 21
  - [Overview](#), page 21
  - [Requirements](#), page 21
  - [How Scripts Work](#), page 21

## Data Replication Manager Overview

DRM provides a disaster-tolerant (DT) solution through the use of hardware redundancy and data replication across multiple sites. The sites can be near each other or separated by some distance.

A single DT DRM configuration requires two HSG80 Array Controller subsystems—one at the local or initiator site, and one at the remote or target site. For installations with multiple initiator subsystems, there can be an equal number of unique target sites, one per pair of initiator controllers.

A DRM configuration consists of paired sites. The *initiator* site carries out primary data processing. *Target* sites are used for data replication. Data processing occurs at the initiator site and the data is replicated or mirrored to the target sites. If a significant failure occurs at the initiator site, data processing can be resumed at the target sites, where the data is intact.

The DRM sites are connected over some distance by fiber optic cable or asynchronous transfer mode (ATM). DRM uses Fibre Channel switches to send the data between the sites. If the sites are too distant to communicate via Fibre Channel, other hardware may be used to connect the sites.

## Peer-to-Peer Remote Copy Function

DRM uses the peer-to-peer remote copy function of the HSG80 controller to achieve data replication. HSG80 controller pairs at the initiator site are connected to their partner HSG80 controller pairs at the target site. Remote copy sets are created from units at the initiator and target sites. These remote copy sets contain storage devices that are mirrors of each other. As data is written to a unit at the initiator site, it is mirrored to its remote copy set partner unit at the target site.

## Hardware Redundancy

DRM requires hardware redundancy. In the event of single component failure at a site, DRM fails over to a redundant component at that site to allow continued operations. For example, if one of the dual-redundant Fibre Channel links between the sites fails, DRM switches to the other link.

## Failover and Failback

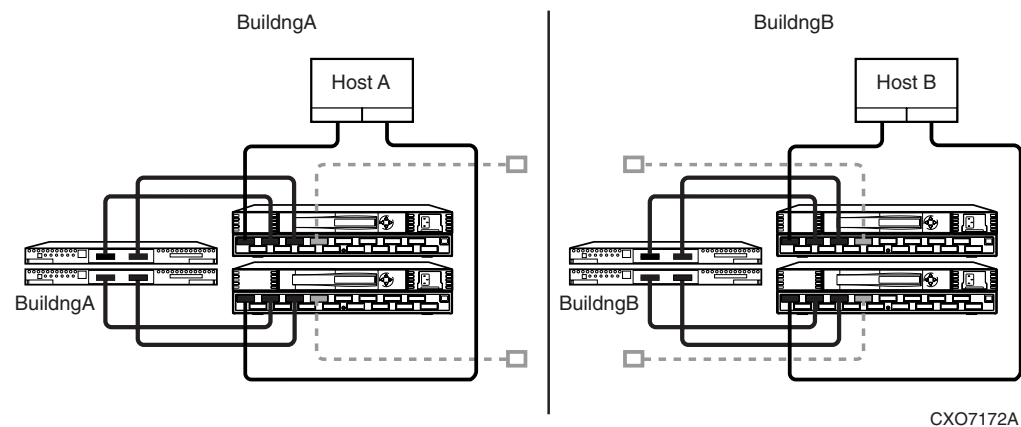
The HSG80 controllers provide *site failover* and *failback* capabilities in case of failures, for planned maintenance, or for site role reversal. Failover makes the data available at the target site after a failure. Failback moves data operations back to the initiator once it has been brought back on line.

Failover and failback require some level of operator intervention, and both require preparation at the initiator and target sites. In all situations, you must decide whether or not a failover is the best course of action. In situations where the failure is limited to failure of a single switch, a single cable, a single storage set, or the like, the least disruptive action may be to quickly repair the failed component instead of performing a site failover.

The example failover and failback procedures in this chapter use fictional “Building A” as the initiator site and “Building B” as the target site. The examples show the following procedures:

- Fail over from Building A (initiator) to Building B (target)
- Fail back from Building B (target) back to Building A (initiator).

Figure 1 illustrates a basic Data Replication Manager configuration.



**Figure 1: Basic Data Replication Manager configuration**

**Note:** This document consistently refers to Building A as the initiator site and Building B as the target site. This does not change, even after failover has occurred to Building B (and before failback has occurred to Building A). While in failover mode, the controllers in Building B are acting as the *initiator* for all remote copy sets, but are still referred to as the *target* in this document.

Once the failback procedure is completed, the controllers in Building A resume their role as the initiator for remote copy sets.

**Note:** Be careful that you don't start a site failover or site failback process too soon. You must wait a minimum of 15 minutes from the completion of a site failover process to begin a site failback procedure. You must also wait a minimum of 15 minutes from the completion of a site failback process to begin a site failover procedure.

## Failover

*Controller failover* is the process that takes place when one controller in a dual-redundant configuration assumes the workload of a failed or redirected companion controller in the same cabinet. *Site failover* is the process that takes place when storage processing is moved from one pair of controllers to another. All processing is shifted to the target (remote) site. This is possible because all data generated at the initiator site has been replicated at the target site, in readiness for such a situation. This book is about site failover and not controller failover within a cabinet.

The site failover method is determined by the severity of the failure or the reason for the failover. A *planned failover* can be used for situations such as an anticipated power disruption, scheduled equipment maintenance at the local site, or the need to transfer operations to another site. An *unplanned failover* is used for events such as multiple controller failures, multiple host failures, or an unplanned power outage at the local site.

After failover has started, it continues until the failure at the initiator site is remedied, and the processing is returned to the initiator (local) site through the failback process.

If the initiator site fails, or if you are planning downtime at the initiator site, you must decide whether to perform a site failover to the target site.

When you perform a failover, the target site assumes the role of the initiator and accesses data until the problem is resolved and you perform a failback. By transferring control of system operation to the target site, you can ensure minimal interruption in data access after a failure.

**Note:** When you perform a site failover operation, you must fail over *all* components. Therefore, if only one component has failed, fixing that single component may be preferable to performing a complete failover.

Always verify that all components at the target site are operational before you begin the site failover.

Table 2 outlines example situations that call for a failover and those that do not.

**Table 2: When and When Not to Failover**

Type of Failure	Recommended Action	
	Remote Copy Set Error_Mode = Normal	Remote Copy Set Error_Mode = Failsafe
Total initiator site loss	Manual intervention to fail over data and processing to target site	Manual intervention to fail over data and processing to target site
Loss of initiator site fabric	Manual intervention to fail over data and processing to target site	Manual intervention to fail over data and processing to target site
Loss of initiator controller pair	Manual intervention to fail over data to target site, and restart of processing at both sites	Manual intervention to fail over data to target site, and restart of processing at both sites
Loss of all intersite links	Failover not necessary	Decide on which site should continue processing: continue at initiator site or fail over to target site
Total target site loss	Failover not necessary	Manually continue processing at initiator site
Loss of target fabric	Failover not necessary	Manually continue processing at initiator site
Loss of target controller pair	Failover not necessary	Manually continue processing at initiator and target sites
Loss of single initiator controller	Failover not necessary	Failover not necessary
Loss of both initiator switches	Manual intervention to fail over data to target site, and restart of processing at both sites	Manual intervention to fail over data to target site, and restart of processing at both sites
Loss of single initiator switch	Failover not necessary	Failover not necessary
Extended power outage at initiator site	Manual intervention to fail over data and processing to target site	Manual intervention to fail over data and processing to target site



**Table 2: When and When Not to Failover (Continued)**

Type of Failure	Recommended Action	
	Remote Copy Set Error_Mode = Normal	Remote Copy Set Error_Mode = Failsafe
Loss of both host bus adapters (non-clustered hosts)	Manual intervention to fail over data to target site, and restart of processing at both sites	Manual intervention to fail over data to target site, and restart of processing at both sites
Loss of single disk in redundant storage	Failover not necessary	Failover not necessary
Loss of single storageset	Failover not necessary	Failover not necessary
Loss of single host of cluster	Failover not necessary	Failover not necessary

**Note:** If one host in a multi-host environment fails, you must decide whether or not a failover is the best course of action.

## Failback

*Controller failback* takes place when one controller in a dual-redundant configuration has been repaired and assumes the workload that it had prior to the failure. *Site failback* is the process that takes place when storage processing is moved back to the original initiator site after whatever failed at the initiator site is repaired or replaced. The failback method (*full copy* or *fast failback*) is determined by the enabling of the write history logging or failsafe switches, the selected mode of operation (synchronous or asynchronous), and whether the failover is planned or unplanned. This book is about site failback and not controller failback within a cabinet.

## Failsafe-Locked and Normal Modes

Failsafe-locked is an error mode that you can set to cease initiator site I/O in the event that the target becomes inaccessible. Several of the procedures in this document provide instructions on how to transition between failsafe-locked mode and normal mode, so that you can resume processing at the initiator site. Transitioning between failsafe and normal modes does not constitute an actual failover and failback event.

## Possible Event Scenarios

If failover becomes necessary, one of the following scenarios will in all likelihood describe your current situation or your desired action.

HP recommends that you rehearse or practice the procedures in this book so that you will be prepared to perform failover and failback quickly and accurately during a crisis.

### Unplanned Site Failover with Full Failback

**Situation:** You have experienced an unplanned loss of the initiator site. The loss could have been caused by a power failure or other event that did not damage initiator site hardware. The duration of the outage at the initiator is unknown. The DRM hardware components (hosts, controllers, switches, for example) at the initiator site will remain intact.

**Action:** You will perform a failover to the target site. When the power is returned to the initiator site and it is back online, you will perform a full failback to the initiator site. Follow the procedure in Chapter 2.

### Unplanned Loss of Target While in Failsafe Mode

**Situation:** You have experienced an unplanned loss of target site function due to failure of the intersite links or similar event such as loss of power at the target, loss of both target switches, and so on. The duration of the outage is unknown. The remote copy sets are in failsafe mode and host I/O is paused.

**Action:** You will remove the targets, then resume host I/O until the connection to the target site is re-established. Follow the procedure in Chapter 3.

### Unplanned Loss of Target While in Normal Mode

**Situation:** Similar to the previous scenario in that you have experienced an unplanned loss of target site function due to failure of the intersite links. However, the remote copy sets are in normal mode. The duration of the outage is unknown, but longer than can be accommodated with write history logging.

**Action:** You will allow host access to the remote copy sets, then resume operations. Follow the procedure in Chapter 4.

### Short Duration Initiator Site Maintenance

**Situation:** You will be performing planned maintenance at the initiator site. The maintenance will be completed within a relatively short period of time (within several hours).

**Action:** You will perform a failover to the target site. Because of the short duration of the planned outage, the write history log will be able to accommodate the accumulated writes. When the initiator is operational and back online, you will perform a fast failback to the initiator with the merge function. Follow the procedure in Chapter 5.

## Resumption of Replication After Short Planned Loss of Target

**Situation:** You will be bringing the target site down for planned maintenance. The remote copy sets are in failsafe mode. The duration of the outage at the target site is relatively short (up to several hours).

**Action:** You will not be performing failover or failback, but you will resume replication after the target site is operational and back online. Follow the procedure in Chapter 6.

## Extended Duration Initiator Site Maintenance

**Situation:** You will be performing planned maintenance at the initiator site. The maintenance will not be completed within a relatively short period of time.

**Action:** You will perform a failover to the target site. Because of the longer duration of the planned outage, the write history log will not be able to accommodate the accumulated writes. Because the write history log cannot capture all host I/O, you will perform a full failback to the initiator when the initiator is operational and back online. Follow the procedure in Chapter 7.

## Resumption of Replication After Extended Planned Loss of Target

**Situation:** The target site will be shut down for an extended length of time, perhaps for maintenance or for a planned power outage. The remote copy set's error mode is set for failsafe.

**Action:** You will reset the remote copy set's error mode to normal to allow host I/O to continue while the target site is offline. Because there is no log unit configured, you will perform a full copy when the target site is back online. Follow the procedure in Chapter 8.

## Unplanned Site Failover Due to Disaster at Initiator

**Situation:** A disaster of some type of disaster (lightning, flood, fire, severe equipment failure, or the like) has damaged the initiator site.

**Action:** You will perform an unplanned site failover to the target site. When the damaged components at the initiator site (hosts, controllers, and switches, for example) have been repaired, and the site is operational and back online, you will perform a failback to the new hardware. Follow the procedure in Chapter 9.

## Planned Role Reversal

**Situation:** You will be performing a planned move of initiator operations from the initiator site to an alternate (target) site.

**Action:** You will prepare the initiator site for the failover, then perform a failover to the alternate site. The original initiator site remains intact, operational, and online as the target during the role reversal. You will then perform a role reversal failback to the original initiator site, when desired. Follow the procedure in Chapter 10.

## Summary of Procedure Choices

[Table 3](#) summarizes the information in the preceding scenarios and directs you to the appropriate chapter in this document for the procedures that you should follow. The table also indicates whether the procedure is available as a scripted procedure.

**Table 3: Procedure Choices**

Event or Condition	Anticipated Duration of Event	Initiator Mode of Operation	Procedure to Follow	Scripting Available
Unplanned loss of initiator site function. Initiator site hardware will not be replaced.	Unknown	Normal or failsafe	<b>Chapter 2:</b> Unplanned Site Failover with Full Failback	Yes
Unplanned loss of target site function. Remote copy sets are in failsafe mode and targets are removed.	Unknown	Failsafe	<b>Chapter 3:</b> Resumption of Operations After Unplanned Loss of Target Site: Failsafe Mode	Yes
Unplanned loss of target site function. Remote copy sets are in normal mode and targets are removed.	Unknown	Normal	<b>Chapter 4:</b> Resumption of Operations After Unplanned Loss of Target Site: Normal Mode	Yes
Planned maintenance outage at initiator site.	Short—up to several hours	Normal or failsafe	<b>Chapter 5:</b> Short Planned Site Failover with Fast Failback	Yes
Planned maintenance outage at target site.	Short—up to several hours	Failsafe	<b>Chapter 6:</b> Resumption of Replication After Short Planned Loss of Target	No
Planned maintenance outage at initiator site.	Extended—many hours or longer	Normal or failsafe	<b>Chapter 7:</b> Extended Planned Site Failover with Full Failback	Yes
Planned maintenance at target site.	Extended—many hours or longer	Failsafe	<b>Chapter 8:</b> Resumption of Replication After Extended Planned Loss of Target	Yes
Unplanned loss of initiator site function. Initiator site hardware will be new.	Unknown	Normal or failsafe	<b>Chapter 9:</b> Unplanned Site Failover with Failback To New Hardware	Yes
Planned change of operations from initiator site to alternate site (role reversal). Initiator site remains operational after role reversal.	Unknown	Normal or failsafe	<b>Chapter 10:</b> Planned Site Role Reversal	Yes

## Planned System Power-Up or Power-Down

If you need to power up or power down your DRM system, follow the procedure in Appendix B.

## Using Scripts to Automate Failover and Failback Procedures

Scripts provide an automated alternative to a manual command entry process for failover and failback operations. The following sections give information about the scripting process.

### Overview

You can perform failover and failback procedures manually, by issuing a complex series of Command Line Interface (CLI) commands. But by using *scripts*, you can automate the process and greatly reduce the need for CLI commands. After you have set up your scripting configuration, you run those scripts, which issue the appropriate CLI commands. However, you must still be able to perform a failover or failback manually with CLI commands if the scripts encounter an abnormal condition that keeps them from running properly.

Using scripts in a DRM environment makes it easier to perform failover and failback. By using a program file, you can start a complete failover or failback sequence. This shortens downtime by eliminating the delay between command entries. Using scripts also ensures that the sequence of commands has been predetermined in a calm environment, rather than during a crisis, when mistakes are more common. The result is a failover and failback process that is timely, consistent, and efficient.

### Requirements

Scripting requires the following components:

- The HP DRM Scripting Kit
- A Perl Interpreter
- HP StorageWorks Command Scripter
- *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Scripting User Guide*

### How Scripts Work

Failover and failback scripts are written in the Perl programming language and reside on the host's local hard drive. For redundancy, the scripts should reside on a host on both the initiator and target sites.

The failover and failback scripts use two user-customized file types to provide variable information: a *configuration file* and an *application action list*.

The configuration files and the application action list are system specific. You must tailor the configuration files and action list for your specific configuration, and for your failover and failback preferences. Your scripts can then use these files to perform failover and failback.

To perform automated failover or failback, you invoke a failover or failback script by running a program file from a command prompt on the system console. Then:

1. The Perl interpreter processes the script, based on the information in the configuration file and the application action list.

2. The script reads the *control table*, which controls the order of CLI commands to be issued, and sends the appropriate sequence of CLI commands (for the controller configuration specified in the configuration file) to the Command Scripter.
3. The Command Scripter sends the commands to the HSG80 controller over the Fibre Channel bus and relays SHOW command verification back for the scripts.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---

Refer to the *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Scripting User Guide* for more information on the scripting process. To download the DRM Scripting Kits that contain configurable, example scripts, go to:

<http://h18000.www1.hp.com/products/sanworks/softwaredrivers/drm/index.html>

# Unplanned Site Failover with Full Failback Procedure

## 2

In this situation you have experienced an unplanned loss of the initiator site. The loss could have been caused by a power failure or other event that did not damage initiator site hardware. The duration of the outage at the initiator is unknown. The DRM hardware components (hosts, controllers, switches, for example) at the initiator site will remain intact. You will perform a failover to the target site. When the power is returned to the initiator site and it is back online, you will perform a full failback to the initiator site.

This chapter contains the following procedures to ensure that unplanned failover and subsequent full failback function properly:

- [Unplanned Failover](#), page 24
  - [Target Site Failover Procedure](#), page 24
- [Full Failback](#), page 32
  - [Initiator Site Preparation Procedure](#), page 32
  - [Target Site Copy Data Procedure](#), page 35
  - [Initiator Site Return Control Procedure](#), page 39
  - [Target Site Restore Procedure](#), page 40
  - [Initiator Site Restoration of Target Connections Procedure](#), page 41

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol ☯ in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

## Unplanned Failover

Use the Unplanned Failover in conjunction with a Full Failback whenever the initiator site cannot carry out its function.

### Target Site Failover Procedure

1. Make sure that the connection between sites is not restored, by entering the following CLI commands:

```
SET THIS CONTROLLER PORT_2_TOPOLOGY = OFFLINE
SET OTHER CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```

2. Verify that the connection is offline by entering the following CLI commands:

```
SHOW_THIS_CONTROLLER
SHOW_OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 1](#).

#### Example Display 1

```
BuildngBTop> show this_controller
Controller:
  HSG80 ZG94115654 Software V87P, Hardware E10
  NODE_ID = 5000-1FE1-0000-4250
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS FAILOVER with ZG94319198
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 16:42:49
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-4253
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 260213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4254
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY = BUILDNGB
.
.
.
BuildngBTop> show other_controller
Controller:
  HSG80 ZG94319198 Software V87P, Hardware E10
  NODE_ID = 5000-1FE1-0000-4250
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS FAILOVER with ZG94115654
  In dual-redundant configuration
  Device Port SCSI address 6
  Time: 10-MAY-2001 16:43:12
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-4251
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 200213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4252
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY = BUILDNGB
.
.
.
```



3. At the target site, the remote copy set units must be preferred to one controller or the other.
- Use the following CLI command to check for the preferred path:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 2](#).

### Example Display 2

```
BuildngBTop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000                          BUILDNGA\RCS1
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to the other controller
  PREFERRED_PATH = THIS_CONTROLLER
  Host based logging NOT specified
  Target NORMAL
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                DISK20000                          BUILDNGA\RCS2
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
  Target NORMAL
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

- If the remote copy set units are not currently preferred, use the following CLI command:

```
SET UnitName PREFERRED_PATH = THIS_CONTROLLER
```

Example: set d1 preferred\_path = this\_controller

or

```
SET UnitName PREFERRED_PATH = OTHER_CONTROLLER
```

Example: set d2 preferred\_path = other\_controller

Repeat this step for each remote copy set unit.

4. Use the following CLI command to fail over each remote copy set (maximum of 12 per subsystem):

```
SITE_FAILOVER InitiatorRemoteCopyName\RemoteCopySetName
```

Example: site\_failover buildngA\rsc1

You will see a confirmation message, as shown in [Example Display 3](#).

### Example Display 3

```
BuildngBTop> site_failover buildngA\rcl1
%EVL--BuildngBTop> --10-MAY-2001 16:48:08-- Instance Code: 0E010064
Template: 144.(90)
.
.
.
Instance Code: 0E010064
```

Repeat this step for all remote copy sets.



- Remove the targets with the following CLI command:

```
SET RemoteCopySetName REMOVE = InitiatorRemoteCopyName\UnitNumber
```

Example: set rcl1 remove = buildngA\d1

You will see a confirmation message, as shown in [Example Display 4](#).

---

**Note:** Removing the targets will cause the target LUN WWIDs to revert to what they were when originally created, and not be the initiator LUN WWIDs used with the remote copy sets.

---

### Example Display 4

```
BuildngBTop> set rcl1 remove = buildngA\d1
%EVL--BuildngBTop> --10-MAY-2001 16:49:55-- Instance Code: 0E078A01
Template: 144.(90)
.
.
.
Instance Code: 0E078A01
```



- Verify that you have removed the targets by entering the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 5](#).

### Example Display 5

```
BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to the other controller
No targets
```

Repeat this step for all remote copy sets.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---

7. Enable host access to all remote copy set units at the target site with the following CLI command:

```
SET UnitName ENABLE = TargetHostConnectionNamex,  
TargetHostConnectionNamey
```

Example: set d1 enable = hostb1,hostb2

You will see a display similar to that in [Example Display 6](#).

### Example Display 6

```
BuildngBTop> set d1 enable=hostb1,hostb2  
Warning 1000: Other host(s) in addition to the one(s) specified can still  
access this unit. If you wish to enable ONLY the host(s)  
specified, disable all access paths (DISABLE_ACCESS=ALL), then  
again enable the ones specified
```

Repeat this step for each remote copy set unit.

8. If you do not recall a target host connection name, use the following command:

```
SHOW CONNECTIONS
```

You will see a display similar to that in [Example Display 7](#).

### Example Display 7

```
BuildngBTop> show connections
```

Connection Name	Operating system	Controller	Port	Address	Status	Unit Offset
BUILDNGAA	PPRC_TARGET HOST_ID=5000-1FE1-0000-01F0	THIS	2		offline	0
				ADAPTER_ID=5000-1FE1-0000-01F4		
BUILDNGAB	PPRC_TARGET HOST_ID=5000-1FE1-0000-01F0	OTHER	2		offline	0
				ADAPTER_ID=5000-1FE1-0000-01F2		
BUILDNGAC	PPRC_INITIATOR HOST_ID=5000-1FE1-0000-01F0	THIS	2	220413	OL this	0
				ADAPTER_ID=5000-1FE1-0000-01F4		
BUILDNGAD	PPRC_INITIATOR HOST_ID=5000-1FE1-0000-01F0	OTHER	2	250413	OL other	0
				ADAPTER_ID=5000-1FE1-0000-01F2		
HOSTA1	WINNT HOST_ID=1000-0000-C920-A7B9	THIS	1	260013	OL this	0
				ADAPTER_ID=1000-0000-C920-A7B9		
HOSTA2	WINNT HOST_ID=1000-0000-C921-3F4E	OTHER	1	200013	OL other	0
				ADAPTER_ID=1000-0000-C921-3F4E		
HOSTB1	WINNT HOST_ID=1000-0000-C921-3E98	THIS	1	220013	OL this	0
				ADAPTER_ID=1000-0000-C921-3E98		
HOSTB2	WINNT HOST_ID=1000-0000-C921-3EFC	OTHER	1	250013	OL other	0
				ADAPTER_ID=1000-0000-C921-3EFC		

9. Verify the target site hosts' access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 8](#).

## Example Display 8

```
BuildngBTop> show units full
LUN                                     Uses                               Used by
-----
D1                                     DISK10000                          BUILDNGB\RCS1
LUN ID:                               6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                    READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Host based logging NOT specified
Size:                               17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                     DISK20000                          BUILDNGB\RCS2
LUN ID:                               6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                    READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
Size:                               17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

In the Access field of the display, all units that are used by remote copy sets will show that both the target host and the initiator controller connections are enabled.

10. If desired, you can enhance host I/O performance by resetting the maximum cached transfer size to the original value used on the initiator. Use this command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: set d1 maximum\_cached\_transfer\_size = 32

Repeat this step for all remote copy set units.

---

**Note:** The default initiator value for maximum cached transfer size is 32.

---

11. Verify that the maximum cached transfer size was correctly modified with the following command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 9](#).

## Example Display 9

```

BuildngBTop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000                          BUILDNGB\RCS1
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
State:
  ONLINE to the other controller
  PREFERRED_PATH = THIS CONTROLLER
  Host based logging NOT specified
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                DISK20000                          BUILDNGA\RCS2
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
.
.
.

```



12. Allow hosts to recognize new units. Some operating systems may require a remapping of the initiator LUN WWIDs to the target LUN WWIDs caused by the removal of the remote copy sets. Follow the steps listed below for each operating system in your heterogeneous configuration:

- a. **HP OpenVMS:** If the target site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.

If the target site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```

Mount the volumes associated with the remote copy set LUNs on each host with access to those LUNs.

- b. **HP Tru64 UNIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the target site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where x is the SCSI bus number.

- c. **HP-UX:**

- 1) If the target site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the target site hosts are not shut down, use the following command to enable HP-UX to recognize the drives and verify that they are present. This command will display only the previously configured failed-over LUNs:

```
ioscan -fnCdisk
```

- 2) Continue with the following commands to access file systems on new failed-over LUNs. If you have no new failed-over LUNs, skip these substeps and go directly to the next step to mount the LUNs:

- a. `/opt/CPQswsp/spmgr display -u`

- b. `/opt/CPQswsp/spmgr add WWN`

Repeat this command for each un-attached WWN that was displayed.

- c. `ioscan -fnCdisk`

If the device special files were not displayed, run `insf -e`, then run `ioscan -fnCdisk` again.

- d. `vgimport VolumeGroupName DeviceSpecialFile`

Repeat this command for each new failed-over LUN.

- 3) Use the following command to mount the LUNs:

```
mount -a
```

---

**Note:** *VolumeGroupName* is the name of the volume group you originally created at the initiator site. The *DeviceSpecialFiles* are from the `ioscan` in the form of `/dev/dsk/c_t_d_`.

For consistency, configure the same *DeviceSpecialFiles* with the same volume groups, logical volumes, and file systems for the failed-over LUNs at the target site with the same LUNs at the initiator site.

---

- d. **IBM AIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the target site hosts are not shut down, use the following commands to enable AIX to recognize the drives and verify that they are present:

```
cfgmgr -v
```

```
lsdev -Cc disk
```

Use the following commands to access file systems on the failed-over LUNs:

```
importvg -y volumegroupname hdiskx
```

```
mount all
```

---

**Note:** *volumegroupname* is the name of the volume group you originally created at the initiator site, and *x* is the number of the `hdisk` assigned to the failed-over LUN. If the `-y volumegroupname` parameter is omitted, AIX will create a default volume group name for you, for example, `vg00`.

---

- e. **Microsoft Windows NT-X86:** Turn on or reboot the hosts at the target site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.

f. **Microsoft Windows 2000:**

- 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.
  - a) On each host, log in using an account that has administrative privileges.
  - b) Open **Computer Management** and click **Disk Management**.
  - c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.
- 2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.

- g. **Novell NetWare:** If the target site hosts are shut down, boot them now. If you are using traditional NetWare volumes, booting the hosts allows Novell NetWare to recognize the drives and automatically mount the volumes. If you are using NSS logical volumes, booting the hosts will recognize the NSS pools and activate them. However, you must manually mount each individual NSS volume by typing `MOUNT VolumeName` at the NetWare console.

If the target site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the `NWCONFIG` utility to issue this same command.

Next, mount the volumes with these commands:

```
MOUNT ALL (for traditional NetWare volumes)
```

```
MOUNT VolumeName (for NSS logical volumes).
```

- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v
disks
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]
drvconfig -v
disks
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes the failover procedure. When the problem that disabled the initiator site is remedied, proceed with the following Full Failback procedure.

## Full Failback

Before performing a full failback, verify that your initiator controller configuration is the same as your target controller configuration.

Compare the status of the controllers, association sets, remote copy sets, units, and connections at the target site with those at the initiator site. A full procedure is detailed in Appendix A. Make sure that any status change is reflected on the target.

Full failback consists of the following procedures:

- Initiator Site Preparation Procedure
- Target Site Copy Data Procedure
- Initiator Site Return Control Procedure
- Target Site Restore Procedure
- Initiator Site Restoration of Target Connections Procedure

## Initiator Site Preparation Procedure

1. Power up the controllers, if necessary. The procedure for power-up is contained in Appendix B.
2. If the controllers were not powered down correctly, lost data may have been generated. Check all units for lost data with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 10](#).

### Example Display 10

```
BuildngATop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000                          Buildnga\RCS1
LUN ID: 6000-1FE1-0007-9DD0-0009-0510-3907-000C
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  INOPERATIVE
  Unit has lost data
  UNKNOWN - Unit is no longer an initiator
  PREFERRED_PATH = THIS CONTROLLER
  WRITE_PROTECT - DATA SAFETY
Size: NOT YET KNOWN
Geometry (C/H/S): NOT YET KNOWN
```

- a. If there is lost data, clear it for each applicable unit with the following CLI command:

```
CLEAR_ERRORS UnitName LOST_DATA
```

Example: `clear_errors d1 lost_data`

Repeat for all units with lost data.



- b. Verify that there is no lost data with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 11](#). If the lost data has been cleared, the display will indicate that the unit is ONLINE.

### Example Display 11

```
BuildngATop> show units full
LUN
-----
D1
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135
NOIDENTIFIER
Switches:
  RUN NOWRITE_PROTECT READ_CACHE
  READAHEAD_CACHE WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to the other controller
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```



3. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the operating system is up and running, and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.
  - b. **HP Tru64 UNIX:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all file system LUNs that have remote copy sets that will be failed over.
  - c. **HP-UX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
  - d. **IBM AIX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
  - e. **Microsoft Windows NT-X86:** If the operating system is up and running, shut it down and power off the hosts.
  - f. **Microsoft Windows 2000:** If the operating system is up and running, shut it down and power off the hosts.
  - g. **Novell NetWare:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.



**Caution:** If you are using NWCS, failure to enter the following two commands will cause all cluster nodes toabend.

If you are using NWCS, you must enter the `cluster down` command. You must also enter the `uldnscs` (unload NetWare Cluster Services) command for all cluster nodes.

- h. **Sun Solaris:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all volumes that have remote copy sets that will be failed over.



4. Disable host access to all remote copy set units by issuing the following CLI command:

```
SET UnitName DISABLE = InitiatorHostConnectionNamex,  
InitiatorHostConnectionNamey
```

Example: `set d1 disable = hosta1,hosta2`



5. If you do not recall the initiator host name, use the following CLI command:

```
SHOW CONNECTIONS
```



6. Verify the lack of host access by entering the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 12](#). Note that connections to HostA1 and HostA2 are missing from the Access field.

## Example Display 12

```
BuildngATop> show units full
```

LUN	Uses	Used by
D1	DISK10000	BUILDNGA\RCS1
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134 NOIDENTIFIER Switches: RUN NOWRITE_PROTECT READ_CACHE READAHEAD_CACHE WRITEBACK_CACHE MAX_READ_CACHED_TRANSFER_SIZE = 32 MAX_WRITE_CACHED_TRANSFER_SIZE = 32 <b>Access:</b> BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD State: ONLINE to the other controller PREFERRED_PATH = THIS CONTROLLER Host based logging NOT specified Size: 17769177 blocks Geometry (C/H/S): ( 5258 / 20 / 169 )		
D2	DISK20000	BUILDNGA\RCS2
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135 NOIDENTIFIER Switches: RUN NOWRITE_PROTECT READ_CACHE READAHEAD_CACHE WRITEBACK_CACHE MAX_READ_CACHED_TRANSFER_SIZE = 32 MAX_WRITE_CACHED_TRANSFER_SIZE = 32 <b>Access:</b> BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD State: ONLINE to the other controller PREFERRED_PATH = OTHER CONTROLLER Host based logging NOT specified Size: 17769177 blocks Geometry (C/H/S): ( 5258 / 20 / 169 )		



7. Set maximum cached transfer size to 128 with the following CLI command:

```
SET unitname MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: `set d1 maximum_cached_transfer_size = 128`

Repeat this step for all remote copy set units.

---

**Note:** This command sets both the read and write maximum cached transfer size.

---

- ▶ 8. If write history logging is enabled, turn it off with the following CLI command:

```
SET AssociationSetName NOLOG_UNIT
```

Example: `set as_d1 nolog_unit`

Repeat for each association set.

- ▶ 9. If there are any association sets, delete them with the following CLI command:

```
DELETE AssociationSetName
```

Example: `delete as_d1`

Repeat for each association set.

- ▶ 10. Delete all remote copy sets using the following CLI command:

```
DELETE RemoteCopySetName
```

Example: `delete rcs1`

You will see a confirmation message, as shown in [Example Display 13](#).

### Example Display 13

```
BuildngATop> delete rcs1

%EVL--BuildngATop> --10-MAY-2001 17:31:51-- Instance Code: 0E020064
Template: 144.(90)
.
.
Instance Code: 0E020064
```

Repeat this procedure for each remote copy set.

- ▶ 11. Continue with Full Failback at the target site with the Target Site Copy Data Procedure.

## Target Site Copy Data Procedure

This section describes how to copy the data from the target site to the initiator site.

- ◎ 1. To restore the connections to the target site, issue the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

```
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

- ◎ 2. Verify that the connections are restored with the following CLI commands:

```
SHOW THIS_CONTROLLER
```

```
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 14](#).

## Example Display 14

```

BuildingBTop> show this_controller
Controller:
HSG80 ZG94115654 Software V87P, Hardware E10
NODE_ID = 5000-1FE1-0000-4250
ALLOCATION_CLASS = 0
SCSI_VERSION = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG94319198
In dual-redundant configuration
Device Port SCSI address 7
Time: 10-MAY-2001 17:34:11
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-4253
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address = 260213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-4254
PORT_2_TOPOLOGY = FABRIC (fabric up)
Address = 260413
REMOTE_COPY = BUILDNGB
.
.
.
BuildingBTop> show other_controller
Controller:
HSG80 ZG94319198 Software V87P, Hardware E10
NODE_ID = 5000-1FE1-0000-4250
ALLOCATION_CLASS = 0
SCSI_VERSION = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG94115654
In dual-redundant configuration
Device Port SCSI address 6
Time: 10-MAY-2001 17:34:20
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-4251
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address = 200213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-4252
PORT_2_TOPOLOGY = FABRIC (fabric up)
Address = 200413
REMOTE_COPY = BUILDNGB
.
.
.

```

3. If you changed an asynchronous remote copy set to synchronous during failover, change it back to asynchronous mode by issuing the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = ASYNCHRONOUS
```

Example: set rcs1 operation\_mode = asynchronous

Repeat this step for all applicable remote copy sets.

4. Add back the target to the initiator unit's remote copy sets with the following CLI command:

```
SET RemoteCopySetName ADD = InitiatorRemoteCopyName\UnitName
```

Example: set rcs1 add = buildngA\d1

You will see a confirmation message, as shown in [Example Display 15](#).

## Example Display 15

```
BuildngBTop> set rcs1 add=buildngA\d1
%EVL--BuildngBTop> --10-MAY-2001 17:37:27-- Instance Code: 0E050064
Template: 144.(90)
.
.
Instance Code: 0E050064
```

Repeat this step for all remote copy sets.

---

**Note:** This command will cause the remote copy sets to begin normalization.

---

5. Enter the following command to see the percentage of normalization completion.

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 16](#).

## Example Display 16

```
BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGA\D1      is COPYING          94% complete
BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGA\D1      is NORMAL
```

---

**Note:** Wait for normalization on all remote copy sets to complete before you proceed.

---

When the units are all normalized, the Target state field of the display will show NORMAL.

6. If you plan to leave load running, you may now add write history logging to your association sets.

---

**Note:** For information on how to add write history logging to association sets, see [Appendix C](#).

---

7. If you plan to leave load running, set failsafe mode with the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: `set rcs1 error_mode = failsafe`

---

**Note:** Failsafe mode cannot be set if the remote copy set is in an association set that will be used for write history logging.

---

8. When you are ready to resume the failback process, continue with the following steps.
9. Stop I/O from the target hosts to the remote copy set units.
10. Disable host access to the remote copy set units with the following CLI command:

```
SET UnitName DISABLE = TargetHostConnectionNamex,  
TargetHostConnectionNamey
```

Example: `set d1 disable = hostb1,hostb2`

11. Verify the lack of host access by entering the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 17](#). Note that connections to HostB1 and HostB2 are missing from the Access field.

### Example Display 17

```
BuildngBTop> show units full
```

LUN	Uses	Used by
D1	DISK10000	BUILDNGB\RCS1
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E NOIDENTIFIER Switches: RUN NOWRITE_PROTECT READ_CACHE READAHEAD_CACHE WRITEBACK_CACHE MAX_READ_CACHED_TRANSFER_SIZE = 32 MAX_WRITE_CACHED_TRANSFER_SIZE = 32 Access: BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD State: ONLINE to the other controller PREFERRED_PATH = THIS_CONTROLLER Host based logging NOT specified Size: 17769177 blocks Geometry (C/H/S): ( 5258 / 20 / 169 )		
D2	DISK20000	BUILDNGB\RCS2
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135 NOIDENTIFIER Switches: RUN NOWRITE_PROTECT READ_CACHE READAHEAD_CACHE WRITEBACK_CACHE MAX_READ_CACHED_TRANSFER_SIZE = 32 MAX_WRITE_CACHED_TRANSFER_SIZE = 32 Access: BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD State: ONLINE to the other controller PREFERRED_PATH = OTHER_CONTROLLER Host based logging NOT specified Size: 17769177 blocks Geometry (C/H/S): ( 5258 / 20 / 169 )		

Repeat this step for all units.

12. Continue with Full Failback at the initiator site with the Initiator Site Return Control Procedure.

## Initiator Site Return Control Procedure

This section describes how to return Data Replication Manager control to the initiator site.



1. Disconnect controller access with the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```



2. Verify that controller access has been disconnected with the following CLI commands:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 18](#).

### Example Display 18

```
BuildngATop> show this_controller
Controller:
HSG80 ZG84906303 Software V87P, Hardware E03
NODE_ID          = 5000-1FE1-0000-01F0
ALLOCATION_CLASS  = 0
SCSI_VERSION     = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG84906237
  In dual-redundant configuration
Device Port SCSI address 7
Time: 10-MAY-2001 17:55:29
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F3
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address          = 220213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F4
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY     = BUILDNGA
.
.
.
BuildngATop> show other_controller
Controller:
HSG80 ZG84906237 Software V87P, Hardware E03
NODE_ID          = 5000-1FE1-0000-01F0
ALLOCATION_CLASS  = 0
SCSI_VERSION     = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG84906303
  In dual-redundant configuration
Device Port SCSI address 6
Time: 10-MAY-2001 17:55:39
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F1
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address          = 250213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F2
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY     = BUILDNGA
.
.
.
```



3. Move the initiator role to the original initiator with the following CLI command:

```
SITE_FAILOVER TargetRemoteCopyName\RemoteCopySetName
```

Example: `site_failover buildngB\rcl1`

You will see a confirmation message, as shown in [Example Display 19](#).

## Example Display 19

```
%EVL--BuildngATop> --10-MAY-2001 17:57:17-- Instance Code: 0E010064
Template: 144.(90)
.
.
Instance Code: 0E010064
```

Repeat this step for each remote copy set.



4. Continue with Full Failback at the target site with the Target Site Restore Procedure.

## Target Site Restore Procedure

1. Write history logging must be disabled to delete association sets. Turn off write history logging, if enabled, with the following CLI command:  

```
SET AssociationSetName NOLOG_UNIT
```

Example: `set as_d1 nolog_unit`

Repeat this procedure for each association set.
2. Delete any association sets with the following CLI command:  

```
DELETE AssociationSetName
```

Example: `delete as_d1`

Repeat this procedure for each association set.
3. Delete all remote copy sets with following CLI command:  

```
DELETE RemoteCopySetName
```

Example: `delete rcs1`

You will see a confirmation message, as shown in [Example Display 20](#).

## Example Display 20

```
BuildngBTop> delete rcs1

%EVL--BuildngBTop> --10-MAY-2001 18:01:12-- Instance Code: 0E020064
Template: 144.(90)
.
.
Instance Code: 0E020064
```

Repeat this step for each remote copy set.

4. Set the maximum cached transfer size to 128 with the following CLI command:  

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: `set d1 maximum_cached_transfer_size = 128`

Repeat this step for each remote copy set unit.

---

**Note:** This command sets both the read and write maximum cached transfer size.

---

5. Verify that maximum cached transfer size for each remote copy set unit is set to 128 by entering the following CLI command:  

```
SHOW UNITS FULL
```



You will see a display similar to that in [Example Display 21](#).

### Example Display 21

```
BuildngBTop> show units full
LUN                                     Uses                               Used by
-----
D1                                     DISK10000
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                                     NOWRITE_PROTECT                   READ_CACHE
  READAHEAD_CACHE                       WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Host based logging NOT specified
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                     DISK20000
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                                     NOWRITE_PROTECT                   READ_CACHE
  READAHEAD_CACHE                       WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to the other controller
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

6. Continue with Full Failback at the initiator site with the Initiator Site Restoration of Target Connections Procedure.

## Initiator Site Restoration of Target Connections Procedure

This section describes how to restore all target connections from the initiator site.

1. To restore the connections to the target site, enter the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

You will see a confirmation message, as shown in [Example Display 22](#).

### Example Display 22

```
%EVL--BuildngATop> --10-MAY-2001 18:05:11-- Instance Code: 0E120064
Template: 144.(90)
.
.
.
Instance Code: 0E120064
```

2. Verify that the connections have been restored with the following commands:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 23](#).

## Example Display 23

```

BuildingATop> show this_controller
Controller:
  HSG80 ZG84906303 Software V87P, Hardware E03
  NODE_ID = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG84906237
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 18:05:38
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F3
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 220213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F4
  PORT_2_TOPOLOGY = FABRIC (fabric up)
  Address = 220413
  REMOTE_COPY = BUILDNGA
.
.
.
BuildingATop> show other_controller
Controller:
  HSG80 ZG84906237 Software V87P, Hardware E03
  NODE_ID = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG84906303
  In dual-redundant configuration
  Device Port SCSI address 6
  Time: 10-MAY-2001 18:05:48
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F1
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 250213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F2
  PORT_2_TOPOLOGY = FABRIC (fabric up)
  Address = 250413
  REMOTE_COPY = BUILDNGA
.
.
.

```



3. Re-enable failsafe mode, if desired. To set failsafe mode, enter the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: set rcs1 error\_mode = failsafe

---

**Note:** Failsafe cannot be set if the remote copy set is in an association set has a write history log attached.

---



4. If you changed an asynchronous remote copy set to synchronous during failover, change it back to asynchronous mode with the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = ASYNCHRONOUS
```

Example: set rcs1 operation\_mode = asynchronous

Repeat this step for all applicable remote copy sets.



5. Create association sets and then add the log unit, if desired. For information on how to create association sets, with or without write history logging, see Appendix C.

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.



6. Enable host access to all units with the following CLI command:

```
SET UnitName ENABLE = InitiatorHostConnectionNamex,  
InitiatorHostConnectionNamey
```

Example: set d1 enable = hosta1,hosta2



7. Verify that you have enabled host access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 24](#).

### Example Display 24

```
BuildngATop> show units full
```

LUN	Uses	Used by
D1	DISK10000	BUILDNGA\RCS1
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134 NOIDENTIFIER Switches: RUN NOWRITE_PROTECT READ_CACHE READAHEAD_CACHE WRITEBACK_CACHE MAX_READ_CACHED_TRANSFER_SIZE = 128 MAX_WRITE_CACHED_TRANSFER_SIZE = 128 Access: BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD, <b>HOSTA1, HOSTA2</b> State: ONLINE to the other controller PREFERRED_PATH = THIS_CONTROLLER Host based logging NOT specified Size: 17769177 blocks Geometry (C/H/S): ( 5258 / 20 / 169 )		
D2	DISK20000	BUILDNGA\RCS2
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135 NOIDENTIFIER Switches: RUN NOWRITE_PROTECT READ_CACHE READAHEAD_CACHE WRITEBACK_CACHE MAX_READ_CACHED_TRANSFER_SIZE = 128 MAX_WRITE_CACHED_TRANSFER_SIZE = 128 Access: BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD <b>HOST A1, HOSTA2</b> State: ONLINE to the other controller PREFERRED_PATH = OTHER_CONTROLLER Host based logging NOT specified Size: 17769177 blocks Geometry (C/H/S): ( 5258 / 20 / 169 )		



8. Set maximum cached transfer size to the original value using the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: set d1 maximum\_cache\_transfer\_size = 32

**Note:** The default setting for maximum\_cache\_transfer\_size is 32.



9. Verify that the maximum cached transfer size was set correctly with this command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 25](#).

### Example Display 25

```
BuildngATop> show units full
LUN                                     Uses                               Used by
-----
D1                                     DISK10000                          BUILDNGA\RCS1
LUN ID:                               6000-1FE1-0000-01F0-0009-8490-6303-0134
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                    READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD,  HOSTA1,  HOSTA2
State:
  ONLINE to the other controller
  PREFERRED_PATH = THIS_CONTROLLER
  Host based logging NOT specified
Size:                                17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                     DISK20000
LUN ID:                               6000-1FE1-0000-01F0-0009-8490-6303-0135
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                    READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD  HOSTA1,  HOSTA2
State:
  ONLINE to the other controller
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
Size:                                17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```



10. Allow hosts to recognize new units. Follow the steps listed below for each operating system in your heterogeneous configuration:

- a. **HP OpenVMS:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.

If the initiator site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```

Mount the volumes associated with the remote copy set LUNs on each host with access to those LUNs.

- b. **HP Tru64 UNIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the initiator site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where x is the SCSI bus number.

- c. **HP-UX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:

```
ioscan -fnCdisk
```

```
mount -a
```

- d. **IBM AIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:

```
cfgmgr -v
```

```
mount all
```

- e. **Microsoft Windows NT-X86:** Turn on or reboot the hosts at the initiator site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.

- f. **Microsoft Windows 2000:**

- 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.

- a) On each host, log in using an account that has administrative privileges.

- b) Open **Computer Management** and click **Disk Management**.

- c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.

- 2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.

- g. **Novell NetWare:** If the initiator site hosts are shut down, boot them now. Booting the hosts allows Novell NetWare to recognize the drives.

If the initiator site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.

- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u  
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]  
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

The Unplanned Site Failover with Full Failback procedure is now complete.

# Resumption of Operations After Unplanned Loss of Target Site Procedure (Failsafe Mode)

## 3

In this situation you have experienced an unplanned loss of target site function due to failure of the intersite links or similar event such as loss of power at the target, loss of both target switches, and so on. The duration of the outage is unknown. The remote copy sets are in failsafe mode and host I/O is paused. You will remove the targets, then resume host I/O until the connection to the target site is re-established. When the remote copy set's error mode is in failsafe, and the connection to the target site is lost, host I/O is paused. This is because the remote copy set's initiator state becomes inoperative with the remote copy set unit in failsafe locked mode.

This chapter contains the procedures needed to resume initiator site processing after an unplanned communication loss while in failsafe mode. All of the steps in this procedure are performed from the initiator site:

- [Verification of Lost Connections Procedure](#), page 48
- [Resumption of Host Access to Remote Copy Sets Procedure](#), page 49
- [Resumption of Operations and Return to Failsafe Mode Procedure](#), page 50

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol ① in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

# Verification of Lost Connections Procedure

This procedure verifies the lost communication link between initiator and target.



1. Verify that the connection to the target site is lost and host I/O is paused. If you are connected to the initiator site controllers when connection to the target site is lost, you will see a confirmation message, as shown in [Example Display 1](#).

## Example Display 1

```
BuildngATop>
%EVL--BuildngATop> --06-JUN-2001 12:57:13-- Instance Code: 0E098901
Template: 144.(90)
  Occurred on 06-JUN-2001 at 12:57:13
.
.
.
Instance Code: 0E098901
%EVL--BuildngATop> --06-JUN-2001 12:57:14-- Instance Code: 02908901
Template: 81.(51)
  Occurred on 06-JUN-2001 at 12:57:13
.
.
.
Instance Code: 02908901
```



2. Verify that the remote copy set's initiator state is inoperative with the unit failsafe locked by issuing the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a confirmation message, as shown in [Example Display 2](#).

## Example Display 2

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = FAILSAFE
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
INOOPERATIVE
Unit failsafe locked
Target state:
BUILDNGB\D1      is COPYING                               0% complete
```



3. Continue the restore process with the [Resumption of Host Access to Remote Copy Sets Procedure](#), which allows host access to the remote copy sets.



## Resumption of Host Access to Remote Copy Sets Procedure

This procedure re-establishes the online status of the initiator site.



1. Use the following CLI command to resume host I/O at the initiator site:

```
SET RemoteCopySetName ERROR_MODE = NORMAL
```

You will see a confirmation message, as shown in [Example Display 3](#).

### Example Display 3

```
BuildngATop> set rcs1 error_mode = normal
%EVL--BuildngATop> --06-JUN-2001 13:02:13-- Instance Code: 0E088864
Template: 144.(90)
Occurred on 06-JUN-2001 at 13:02:13
.
.
.
Instance Code: 0E088864
```



2. Remove the targets with the following CLI command:

```
SET RemoteCopySetName REMOVE = TargetRemoteCopyName\UnitNumber
```

Example: set rcs1 remove = buildngB\d1

You will see a confirmation message, as shown in [Example Display 4](#).

### Example Display 4

```
BuildngATop> set rcs1 remove = buildngB\d1

%EVL--BuildngATop> --10-MAY-2001 16:49:55-- Instance Code: 0E078A01
Template: 144.(90)
.
.
.
Instance Code: 0E078A01
```



3. Verify that you have removed the targets by entering the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 5](#).

### Example Display 5

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to the other controller
No targets
```



4. Resume applications for each operating system in your heterogeneous configuration.



5. Continue the restore process with the [Resumption of Operations and Return to Failsafe Mode Procedure](#), which verifies the re-established connection to the target site.

## Resumption of Operations and Return to Failsafe Mode Procedure

This procedure ensures that replication of I/O to the target site is re-established.



1. When connection to the target site is back, you will see a confirmation message, as shown in [Example Display 6](#).

### Example Display 6

```
%EVL--BuildngATop> --21-JAN-1946 01:38:56-- Instance Code: 0258000A
Template: 81.(51)
Power On Time: 0. Years, 72. Days, 3. Hours, 15. Minutes, 34. Seconds
.
.
.
Instance Code: 0258000A
```



2. Add back the target unit to the remote copy sets with the following CLI command:

```
SET RemoteCopySetName ADD = TargetRemoteCopyName\UnitName
```

Example: set rcs1 add = buildngB\d1

You will see a confirmation message, as shown in [Example Display 7](#).

### Example Display 7

```
BuildngATop> set rcs1 add=buildngB\d1

%EVL--BuildngATop> --10-MAY-2001 17:37:27-- Instance Code: 0E050064
Template: 144.(90)
Occurred on 10-MAY-2001 at 17:37:27
.
.
.
Instance Code: 0E050064
```

Repeat this step for all remote copy sets.

---

**Note:** This command will cause the remote copy sets to begin normalization.

---



3. Enter the following command to see the percentage of normalization completion for all remote copy sets.

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 8](#).

### Example Display 8

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGB\D1      is COPYING          94% complete
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
```

```

RCS1          remote copy                               D1          AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGB\D1      is NORMAL

```

When the units are all normalized, the Target field of the display will show NORMAL.

---

**Note:** Wait for normalization on all remote copy sets to complete before you proceed.

---

- ▶ 4. Return the remote copy set's error mode back to failsafe with the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

- ▶ 5. Verify that the error mode is failsafe, that the initiator state is online, and that the target state is normal with the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 9](#).

### Example Display 9

```

BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1          remote copy                               D1          AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = FAILSAFE
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL

```

This completes the procedure for resuming initiator site processing after an unplanned communication loss while in failsafe mode.



# Resumption of Operations After Unplanned Loss of Target Site Procedure (Normal Mode)

## 4

This situation is similar to the scenario in Chapter 3 in that you have experienced an unplanned loss of target site function due to failure of the intersite links, but in this case, the remote copy sets are in normal mode. The duration of the outage is unknown, but longer than can be accommodated with write history logging. You will allow host access to the remote copy sets, then resume operations.

This chapter contains the following procedures to resume initiator site processing after an unplanned communication loss while in normal mode. All of the steps in this procedure are performed from the initiator site:

- [Verification of Lost Connections Procedure](#), page 54
- [Resumption of Host Access to Remote Copy Sets Procedure](#), page 54
- [Verification of Resumption of Operations Procedure](#), page 55

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol ④ in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

## Verification of Lost Connections Procedure

This procedure verifies the lost communication link between initiator and target.



1. Verify that the connection to the target site is lost. If you are connected to the initiator site controllers when connection to the target site is lost, you will see a confirmation message, as shown in [Example Display 1](#).

### Example Display 1

```
BuildngATop>
%EVL--BuildngATop> --06-JUN-2001 12:57:13-- Instance Code: 0E0F8B01
Template: 144.(90)
  Occurred on 06-JUN-2001 at 12:57:13
.
.
.
Instance Code: 0E098901
```



2. Continue the restore process with the [Resumption of Host Access to Remote Copy Sets Procedure](#), which allows host access to the remote copy sets.

## Resumption of Host Access to Remote Copy Sets Procedure

This procedure re-establishes the online status of the initiator site.



1. Determine which controller your remote copy set LUN is online to with the following CLI command. This is important because the command in step 2 to remove the LUN must be issued from the controller that the LUN is online to.

```
SHOW RemoteCopySetName
```

Example: `show rcs1`

You will see a display similar to that in [Example Display 2](#).

### Example Display 2

```
BuildngATop> show rcs1
Name                               Uses          Used by
-----
RCS1          remote copy          D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to this controller
Target state:
  BUILDNGB\D1      is NORMAL
```



2. If necessary, move to the controller that the remote copy set LUN is online to.



3. Remove the remote copy set LUN with the following CLI command:

```
SET RemoteCopySetName REMOVE = TargetRemoteCopyName\UnitNumber
```

Example: `set rcs1 remove = buildngB\d1`

You will see a confirmation message, as shown in [Example Display 3](#).

### Example Display 3

```
BuildngATop> set rcs1 remove = buildngB\d1

%EVL--BuildngATop> --10-MAY-2001 16:49:55-- Instance Code: 0E078A01
Template: 144.(90)
.
.
.
Instance Code: 0E078A01
```



4. Verify that you have removed the targets by entering the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 4](#).

### Example Display 4

```
BuildngATop> show remote_copy_sets full
Name                               Uses                Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to the other controller
No targets
```



5. Continue the restore process with the [Verification of Resumption of Operations Procedure](#), which verifies the re-established connection to the target site.

## Verification of Resumption of Operations Procedure

This procedure ensures that I/O to the target site is re-established.



1. When connection to the target site is back, you will see a confirmation message, as shown in [Example Display 5](#).

### Example Display 5

```
%EVL--BuildngATop> --21-JAN-1946 01:38:56-- Instance Code: 0E030064
Template: 81.(51)
.
.
.
Instance Code: 0258000A
```



2. Add back the target unit to the remote copy sets with the following CLI command:

```
SET RemoteCopySetName ADD = TargetRemoteCopyName\UnitName
```

Example: set rcs1 add = buildingB\d1

You will see a confirmation message, as shown in [Example Display 6](#).

## Example Display 6

```
BuildngATop> set rcs1 add = buildngB\d1
%EVL--BuildngBTop> --10-MAY-2001 17:37:27-- Instance Code: 0E050064
Template: 144.(90)
.
.
.
Instance Code: 0E050064
```

Repeat this step for all remote copy sets.

---

**Note:** This command will cause the remote copy sets to begin normalization.

---



3. Enter the following command to see the percentage of normalization completion for all remote copy sets.

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 7](#).

## Example Display 7

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGB\D1      is COPYING          94% complete

BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGB\D1      is NORMAL
```

When the units are all normalized, the Target field of the display will show NORMAL.

---

**Note:** Wait for normalization on all remote copy sets to complete before you proceed.

---



4. Verify that the error mode is set to normal, that the initiator state is online, and that the target state is normal, with the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 8](#).



## Example Display 8

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
```

This completes the procedure for resuming initiator site processing after an unplanned communication loss while in normal mode.



# Short Planned Site Failover with Fast Failback Procedure

## 5

You are planning on performing scheduled maintenance at the initiator site. The maintenance will be completed within a relatively short period of time (within several hours).

You will perform a failover to the target site. Because of the short duration of the planned outage, the write history log will be able to accommodate the accumulated writes. When the initiator is operational and back online, you will perform a fast failback to the initiator with the merge function.

This chapter contains the procedures needed to ensure that failover and subsequent failback during short duration maintenance at the initiator site function properly:

- [Power-Up and Power-Down](#), page 60
- [Planned Site Failover](#), page 60
- [Fast Failback](#), page 75

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol ① in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

# Power-Up and Power-Down

If you need to power up or power down your DRM system, follow the instructions in Appendix B.

# Planned Site Failover

To carry out a planned failover, follow the procedure outlined in this chapter, in conjunction with a fast failback. A planned failover consists of the following procedures:

- Initiator Site Preparation Procedure
- Target Site Failover Procedure
- Target Host Setup Procedure

## Initiator Site Preparation Procedure

- ▶
1. Before performing the failover procedure, locate your record of SHOW command output that details the current initiator configuration. Verify that your target controller configuration is the same as your initiator controller configuration. Compare the status of the controllers, association sets, remote copy sets, units, and connections. Appendix A contains the full procedure.
- ▶
2. Verify that all remote copy sets are in normal error mode by issuing the following command:

```
SHOW REMOTE_COPY_SETS FULL
```

The output shows the status of remote copy sets.

You will see a display similar to that in [Example Display 1](#).

### Example Display 1

```
BuildngATop> SHOW REMOTE_COPY_SETS FULL
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
RCS2      remote copy              D2
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D2) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D2      is NORMAL
```



3. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the operating system is up and running, and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.
  - b. **HP Tru64 UNIX:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all file system LUNs that have remote copy sets that will be failed over.
  - c. **HP-UX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
  - d. **IBM AIX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
  - e. **Microsoft Windows NT-X86:** If the operating system is up and running, shut it down and power off the hosts.
  - f. **Microsoft Windows 2000:** If the operating system is up and running, shut it down and power off the hosts.
  - g. **Novell NetWare:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.



**Caution:** If you are using NWCS, failure to enter the following two commands will cause all cluster nodes to abend.

If you are using NWCS, you must enter the `cluster down` command. You must also enter the `uldnscs` (unload NetWare Cluster Services) command for all cluster nodes.

- h. **Sun Solaris:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all volumes that have remote copy sets that will be failed over.



4. If your remote copy sets are set for asynchronous operation mode, switch to synchronous mode using the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = SYNCHRONOUS
```

Example: `set RCS1 operation_mode = synchronous`

Repeat this step for all applicable remote copy sets.



5. Turn off write history logging, if enabled, with the following CLI command:

```
SET AssociationSetName NOLOG_UNIT
```

Example: `set as_d1 nolog_unit`

Repeat this procedure for each association set.



6. Delete any association sets with the following CLI command:

```
DELETE AssociationSetName
```

Example: delete as\_d1

Repeat this procedure for each association set.



7. Disable access to the remote copy set units with the following CLI command:

---

**Note:** Do not disable access to the target connection.

---

```
SET UnitName DISABLE = InitiatorHostConnectionNamex,  
InitiatorHostConnectionNamey
```

Example: set d1 disable = hosta1,hosta2

Repeat this step for all remote copy set units.



8. Each remote copy set unit should have four connections enabled to TargetRemoteCopyNameA, TargetRemoteCopyNameB, TargetRemoteCopyNameC, and TargetRemoteCopyNameD.

- a. To see the connections, enter the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 2](#).

## Example Display 2

```
BuildngATop> SHOW UNITS FULL
LUN                                     Uses                               Used by
-----
D1                                     DISK10000                          BUILDNGA\RCS1
LUN ID:                               6000-1FE1-0000-01F0-0009-8490-6303-0134
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Host based logging NOT specified
Size:                                17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                     DISK20000                          BUILDNGA\RCS2
LUN ID:                               6000-1FE1-0000-01F0-0009-8490-6303-0135
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
Size:                                17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

- b. If access to the target site controllers is not currently enabled, enable access by issuing the following command for each applicable remote copy set unit:

```
SET UnitName ENABLE = TargetRemoteCopyNameA,
TargetRemoteCopyNameB, TargetRemoteCopyNameC,
TargetRemoteCopyNameD
```

Example: set d1 enable = buildngbA, buildngbB, buildngbC, buildngbD



9. Set maximum cached transfer size to 128 with the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: set d1 maximum\_cached\_transfer\_size = 128

Repeat this step for all units.

---

**Note:** This command sets both the read and write maximum cached transfer size.

---



10. Continue the failover process at the target site with the Target Site Failover Procedure.

## Target Site Failover Procedure



1. At the target site, the units must be preferred to one controller or the other.
  - a. Use the following CLI command to check for the preferred path:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 3](#).

### Example Display 3

```
BuildngBTop> SHOW UNITS FULL
LUN                               Uses                               Used by
-----
D1                                DISK10000                          BUILDNGA\RCS1
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Target NORMAL
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

```

D2                                DISK20000                                BUILDNGA\RCS2
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                                READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
  Target NORMAL
Size:          17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```

- b. If units are not currently preferred, use the following CLI command:

```
SET UnitName PREFERRED_PATH = THIS_CONTROLLER
```

Example: set d1 preferred\_path = this\_controller

or

```
SET UnitName PREFERRED_PATH = OTHER_CONTROLLER
```

Example: set d2 preferred\_path = other\_controller

Repeat this step for each remote copy set unit that needs to be preferred.

⦿

2. Disconnect controller access with the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```

```
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```

⦿

3. Verify that controller access has been disconnected with the following CLI commands:

```
SHOW THIS_CONTROLLER
```

```
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 4](#).

## Example Display 4

```

BuildngBTop> show this_controller
Controller:
  HSG80 ZG84906303 Software V87P, Hardware E03
  NODE_ID          = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS  = 0
  SCSI_VERSION     = SCSI-3
  Configured for MULTIBUS FAILOVER with ZG84906237
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 17:55:29
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F3
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address          = 220213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F4
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY = BUILDNGA
.
.
.
BuildngBTop> show other_controller
Controller:
  HSG80 ZG84906237 Software V87P, Hardware E03
  NODE_ID          = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS  = 0
  SCSI_VERSION     = SCSI-3
  Configured for MULTIBUS FAILOVER with ZG84906303
  In dual-redundant configuration

```



```

Device Port SCSI address 6
Time: 10-MAY-2001 17:55:39
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F1
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address          = 250213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F2
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY = BUILDNGA
.
.
.

```

- ④ 4. Move the initiator role to the target controller with the following CLI command:

```
SITE_FAILOVER InitiatorRemoteCopyName\RemoteCopySetName
```

Example: `site_failover buildnga\rcl1`

You will see a confirmation message, as shown in [Example Display 5](#).

### Example Display 5

```

BuildngBTop> site_failover Buildnga\rcl1

%EVL--BuildngBTop> --10-MAY-2001 15:47:39-- Instance Code: 0E010064
Template: 144.(90)
.
.
.
Instance Code: 0E010064

```

Repeat this step for each remote copy set.

- ④ 5. Restore the connections to the initiator site with the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

```
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

- ④ 6. Verify that connections have been restored by issuing the following CLI command:

```
SHOW THIS_CONTROLLER
```

```
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 6](#).

### Example Display 6

```

BuildngBTop> show this_controller
Controller:
  HSG80 ZG94115654 Software V87P, Hardware E10
  NODE_ID          = 5000-1FE1-0000-4250
  ALLOCATION_CLASS = 0
  SCSI_VERSION     = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG94319198
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 17:34:11
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-4253
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address          = 260213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4254
  PORT_2_TOPOLOGY = FABRIC (fabric up)
  Address          = 260413
  REMOTE_COPY = BUILDNGB
.
.
.
BuildngBTop> show other_controller

```

```
Controller:
  HSG80 ZG94319198 Software V87P, Hardware E10
  NODE_ID           = 5000-1FE1-0000-4250
  ALLOCATION_CLASS   = 0
  SCSI_VERSION      = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG94115654
  In dual-redundant configuration
  Device Port SCSI address 6
  Time: 10-MAY-2001 17:34:20
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-4251
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address          = 200213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4252
  PORT_2_TOPOLOGY = FABRIC (fabric up)
  Address          = 200413
  REMOTE_COPY     = BUILDNGB
.
.
.
```

## Create a Log Unit

- ① 1. If not already created during the target site setup procedure, create a mirrorset for the log disk by issuing the following CLI command:

```
ADD MIRRORSET MirrorsetName DiskName1 DiskName2
```

Example: add mirr mir\_dllog disk50100 disk60100

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

To minimize the number of devices used for logging, you can create and use one-member mirrorsets. Because the data is written to one disk, the logged data will not be protected. However, all of this data is also written to the initiator unit. In the case of a log disk failure, you would incur a full normalization, rather than a mini-merge, when access to the target is re-established.

The command to create a one-member mirrorset is the same as above, except only one disk is listed.

Example: add mirr mir\_dllog disk50100

---

- ② 2. Initialize the mirrorset with the following CLI command:
- ③ 3. Verify that you have created a mirrorset by issuing the following CLI command:

```
INITIALIZE ContainerName
```

Example: initialize mir\_dllog

```
SHOW MIRRORSET
```

You will see a display similar to that in [Example Display 7](#).

## Example Display 7

Name	StorageSet	Uses	Used by
MIR_D1LOG	mirrorset	DISK50100 DISK60100	

4. Present the log unit to the controller with the following CLI command:  

```
ADD UNIT UnitName ContainerName
```

Example: add unit d10 mir\_d1log
5. Verify that the controller recognizes the log unit by issuing the following CLI command:  

```
SHOW UNITS
```

You will see a display similar to that in [Example Display 8](#).

## Example Display 8

LUN	Uses	Used by
D10	MIR_D1LOG	

## Create Association Sets and Assign a Log Unit

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

1. Create an association set with the following CLI command:  

```
ADD ASSOCIATIONS AssociationSetName RemoteCopySetName
```

Example: add associations as\_d1 rcs1

Repeat this step for each association set.

**Note:** You can add additional members to the association set by issuing the following CLI command:

```
Set AssociationSetName ADD = RemoteCopySetName
```

Example: set as\_d1 add = rcs1

2. Disable node access to the log unit with the following CLI command:  

```
SET UnitNumber DISABLE_ACCESS_PATH = ALL
```

Example: set d10 disable\_access\_path = all
3. Disable writeback cache on log units with the following CLI command:  

```
SET UnitNumber NOWRITEBACK_CACHE
```

Example: set d10 nowriteback\_cache
4. Check to see that you have disabled access and writeback cache with the following command:  

```
SHOW D10
```

You will see a display similar to that in [Example Display 9](#).

### Example Display 9

```

LUN                                     Uses          Used by
-----
D10                                     MIR_D1LOG
LUN ID:          6000-1FE1-0001-3B10-0009-9130-8044-0066
IDENTIFIER = 10
Switches:
RUN              NOWRITE_PROTECT          READ_CACHE
READAHEAD_CACHE  NOWRITEBACK_CACHE
MAXIMUM_CACHED_TRANSFER_SIZE = 32
Access:
  None
State:
  ONLINE to this controller
  Not reserved

  PREFERRED_PATH = THIS_CONTROLLER
Host based logging NOT specified
Size:          35556389 blocks
Geometry (C/H/S): ( 7000 / 20 / 254 )

```

5. Assign the log units to the association sets with the following CLI command:  
`SET AssociationSetName LOG_UNIT = D10`  
 Example: `set as_d1 log_unit = d10`
6. Check to see the switch status of the association set by issuing the following CLI command:  
`SHOW ASSOCIATIONS FULL`  
 You will see a display similar to [Example Display 10](#).

### Example Display 10

```

BuildngBTop> show associations full
Name          Association          Uses          Used by
-----
AS_D1         association          RCS1
Switches:
  NOFAIL ALL
  NOORDER ALL
  LOG_UNIT = D10 (No data logged)

```

Repeat this step for each association set.

7. Continue the failover procedure at the target site with the Target Host Setup Procedure.

## Target Host Setup Procedure

1. You can enhance host I/O performance by resetting the maximum cached transfer size to the value used on the initiator. Use this command:  
`SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue`  
 Example: `set d1 maximum_cached_transfer_size = 32`  
 Repeat this step for each unit.

---

**Note:** The default maximum cached transfer size is 32.

---

- 2. Suspend write operations to the initiator site with the following CLI command:

```
SET RemoteCopySetName SUSPEND = InitiatorName\UnitName
```

Example: `set rcs1 suspend = buildngA\d1`

You will see a confirmation message, as shown in [Example Display 11](#).

### Example Display 11

```
%EVL--BuildngBTop> --07-JUN-2001 11:51:01-- Instance Code: 0E210064
Template: 144.(90)
.
Instance Code: 0E210064
```

Repeat this step for all remote copy sets.

- 3. Use the following CLI command to verify that the remote copy sets are suspended and that the log unit is available.

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 12](#).

### Example Display 12

```
BuildngBTop> SHOW REMOTE_COPY_SETS FULL
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGA\D1      is SUSPENDED      LOG_UNIT 99% available
```

- 4. Give the target site hosts access to the units that are used by remote copy sets in the storage subsystems, with this command:

```
SET UnitName ENABLE = TargetHostConnectionNamex,
TargetHostConnectionNamey
```

Example: `set d1 enable = hostb1,hostb2`

You will see a display similar to that in [Example Display 13](#).

### Example Display 13

```
BuildngBTop> set d1 enable=hostb1,hostb2
Warning 1000: Other host(s) in addition to the one(s) specified can still
access this unit. If you wish to enable ONLY the host(s)
specified, disable all access paths (DISABLE_ACCESS=ALL), then
again enable the ones specified
```

- 5. After you have given the target site hosts access, verify the access with the following CLI command:

```
SHOW UNIT_NAME
```

You will see a display similar to that in [Example Display 14](#).

## Example Display 14

```

BuildngBTop> show d1
LUN                                     Uses                               Used by
-----
D1
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT      READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = THIS_CONTROLLER
    Host based logging NOT specified
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

```

Repeat this step for each unit.



- If you do not recall a target host connection name, use the following command:

```
SHOW CONNECTION
```

You will see a display similar to that in [Example Display 15](#).

## Example Display 15

```

BuildngBTop> show connection
Connection
Name      Operating system  Controller  Port  Address      Status      Unit
Offset
BUILDNGAA  PPRC_TARGET          THIS        2      220413      offline     0
HOST_ID=5000-1FE1-0000-01F0 ADAPTER_ID=5000-1FE1-0000-01F4
BUILDNGAB  PPRC_TARGET          OTHER        2      220413      offline     0
HOST_ID=5000-1FE1-0000-01F0 ADAPTER_ID=5000-1FE1-0000-01F2
BUILDNGAC  PPRC_INITIATOR        THIS        2      220413      OL this     0
HOST_ID=5000-1FE1-0000-01F0 ADAPTER_ID=5000-1FE1-0000-01F4
BUILDNGAD  PPRC_INITIATOR        OTHER        2      250413      OL other    0
HOST_ID=5000-1FE1-0000-01F0 ADAPTER_ID=5000-1FE1-0000-01F2
HOSTA1     WINNT                 THIS        1      260013      OL this     0
HOST_ID=1000-0000-C920-A7B9 ADAPTER_ID=1000-0000-C920-A7B9
HOSTA2     WINNT                 OTHER        1      200013      OL other    0
HOST_ID=1000-0000-C921-3F4E ADAPTER_ID=1000-0000-C921-3F4E
HOSTB1     WINNT                 THIS        1      220013      OL this     0
HOST_ID=1000-0000-C921-3E98 ADAPTER_ID=1000-0000-C921-3E98
HOSTB2     WINNT                 OTHER        1      250013      OL other    0
HOST_ID=1000-0000-C921-3EFC ADAPTER_ID=1000-0000-C921-3EFC

```



- To verify that the previous steps have been completed successfully, issue the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

The output shows the status of remote copy sets, as shown in [Example Display 16](#).

## Example Display 16

```
BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGA\D1      is LOGGING      LOG_UNIT 99% available
```

---

**Note:** Be sure that the units you see (listed under Target state) are at the initiator site.

---



8. To verify that the target hosts can connect to the LUNs, use this command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 17](#).

## Example Display 17

```
BuildngBTop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000                          BUILDNGB\RCS1
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Host based logging NOT specified
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                DISK20000                          BUILDNGA\RCS2
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
Target NORMAL
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

In the Access field of the display, all units that are used by remote copy sets will show that the target host connections are enabled. This will also show the initiator controller connections.



9. Allow hosts to recognize new units. Follow the steps listed below for each operating system in your heterogeneous configuration:

- a. **HP OpenVMS:** If the target site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.

If the target site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```

- b. **HP Tru64 UNIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the target site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where x is the SCSI bus number.

- c. **HP-UX:**

- 1) If the target site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the target site hosts are not shut down, use the following command to enable HP-UX to recognize the drives and verify that they are present. This command will display only the previously configured failed-over LUNs:

```
ioscan -fnCdisk
```

- 2) Continue with the following commands to access file systems on new failed-over LUNs. If you have no new failed-over LUNs, skip these substeps and go directly to the next step to mount the LUNs:

a. `/opt/CPQswsp/spmgr display -u`

b. `/opt/CPQswsp/spmgr add WWN`

Repeat this command for each un-attached WWN that was displayed.

c. `ioscan -fnCdisk`

If the device special files were not displayed, run `insf -e`, then run `ioscan -fnCdisk` again.

d. `vgimport VolumeGroupName DeviceSpecialFile`

Repeat this command for each new failed-over LUN.

- 3) Use the following command to mount the LUNs:

```
mount -a
```

---

**Note:** *VolumeGroupName* is the name of the volume group you originally created at the initiator site. The *DeviceSpecialFiles* are from the `ioscan` in the form of `/dev/dsk/c_t_d_`.

For consistency, configure the same *DeviceSpecialFiles* with the same volume groups, logical volumes, and file systems for the failed-over LUNs at the target site with the same LUNs at the initiator site.

---



- d. **IBM AIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the target site hosts are not shut down, use the following commands to enable AIX to recognize the drives and verify that they are present:

```
cfgmgr -v
lsdev -Cc disk
```

Use the following commands to access file systems on the failed-over LUNs:

```
importvg -y volumegroupname hdiskx
mount all
```

---

**Note:** *volumegroupname* is the name of the volume group you originally created at the initiator site, and *x* is the number of the hdisk assigned to the failed-over LUN. If the *-y volumegroupname* parameter is omitted, AIX will create a default volume group name for you, for example, *vg00*.

---

- e. **Microsoft Windows NT-X86:** Reboot the hosts at the target site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.
- f. **Microsoft Windows 2000:**

- 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.
  - a) On each host, log in using an account that has administrative privileges.
  - b) Open **Computer Management** and click **Disk Management**.
  - c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.
- 2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.

- g. **Novell NetWare:** If the target site hosts are shut down, boot them now. If you are using traditional NetWare volumes, booting the hosts allows Novell NetWare to recognize the drives and automatically mount the volumes. If you are using NSS logical volumes, booting the hosts will recognize the NSS pools and activate them. However, you must manually mount each individual NSS volume by typing MOUNT *VolumeName* at the NetWare console.

If the target site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.

Next, mount the volumes with these commands:

```
MOUNT ALL (for traditional NetWare volumes)
MOUNT VolumeName (for NSS logical volumes).
```

- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u  
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]  
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes Planned Site Failover. Proceed with Fast Failback in the next section.

## Fast Failback

Fast Failback is used in conjunction with Planned Site Failover. Before performing Fast Failback, locate your record of `SHOW` command output that details the initiator configuration. This is a planned event and is performed only after both initiator and target are synchronized.

Compare the status of the controllers, association sets, remote copy sets, units, and connections. Appendix A contains the full procedure. Verify that your target controller configuration is the same as your initiator controller configuration.

Fast Failback consists of the following procedures:

- Target Site Failback Procedure
- Initiator Site Cleanup Procedure

### Target Site Failback Procedure

- ① 1. When the maintenance at the initiator site is complete, reconnect the targets.
- ② 2. Allow the write history log to merge with the following CLI command:  
`SET RemoteCopySetName RESUME = InitiatorName\UnitName`  
 Example: `set rcs1 resume = buildnga\d1`  
 You will see a confirmation message, as shown in Example Display 18.

#### Example Display 18

```
%EVL--BuildngBTop> --07-JUN-2001 12:09:41-- Instance Code: 0E220064
Template: 144.(90)
.
.
Instance Code: 0E220064
```

---

**Note:** You must wait for normalization on all remote copy sets to complete before you can proceed.

---

- ③ 3. Shut down the target site hosts (this is not necessary for HP OpenVMS, HP Tru64 UNIX, HP-UX, IBM AIX, Sun Solaris, and Novell Netware operating systems).

---

**Note:** If hosts are not shut down, you must remove host access on all LUNs used with remote copy sets.

---

- ④ 4. Disable host access to the target units for all remote copy sets with the following CLI command:

```
SET UnitName DISABLE = TargetHostConnectionNamex,
TargetHostConnectionNamey
```

Example: `set d1 disable = hostb1,hostb2`

Repeat this step for all units.

- ⑤ 5. You may now boot hosts for non-remote copy set units.

- ⑥ 6. Turn off write history logging, if enabled, with the following CLI command:  

```
SET AssociationSetName NOLOG_UNIT
```

Example: `set as_d1 nolog_unit`

Repeat this procedure for each association set.
- ⑥ 7. Delete any association sets with the following CLI command:  

```
DELETE AssociationSetName
```

Example: `delete as_d1`

Repeat this procedure for each association set.
- ⑥ 8. Move control of the remote copy sets to the original initiator with the following CLI command:  

```
SET RemoteCopySetName INITIATOR = InitiatorRemoteCopyName\UnitName
```

Example: `set rcs1 initiator = buildnga\d1`
- ⑥ 9. Verify original initiator control with the following CLI command:  

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in Example Display 19. The No REMOTE\_COPY\_SETS display indicates that the original initiator has control.

### Example Display 19

```
BuildngBTop> show remote_copy_sets full  
No REMOTE_COPY_SETS
```

Repeat this step for all remote copy sets.

---

**Note:** If, after issuing this command for one of the remote copy sets, you get the error message: Error: Rem Cp Set specified is currently in a transient state, wait a few seconds and try again. The command will eventually succeed.

---

- ⑥ 10. If maximum cached transfer size was changed for the target units as part of the failover procedure, set it back to 128 with the following CLI command:  

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: `set d1 maximum_cached_transfer_size = 128`
- ⑥ 11. Verify that the maximum cached transfer size has been changed to 128 with the following CLI command:  

```
SHOW UnitName
```

You will see a display similar to that in Example Display 20.

## Example Display 20

```
BuildngBTop> show d1
LUN
-----
D1
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 128
    MAX_WRITE_CACHED_TRANSFER_SIZE = 128
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
  State:
    ONLINE to the other controller
    PREFERRED_PATH = THIS_CONTROLLER
    Target NORMAL
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
```

Repeat this procedure for each unit.

---

**Note:** This command sets both the read and write maximum cached transfer size.

---

12. Continue with the failback procedure at the initiator site with the Initiator Site Cleanup Procedure.

## Initiator Site Cleanup Procedure

1. You can enhance host I/O performance by resetting the maximum cached transfer size to the original value used on the initiator. Use this command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: set d1 maximum\_cached\_transfer\_size = 32

Repeat this step for each unit.

2. Verify the above step with the following CLI command:

```
SHOW_UNITS_FULL
```

You will see a display similar to that in Example Display 21.

## Example Display 21

```
BuildngATop> show units full
LUN
-----
D1
  LUN ID:          6000-1FE1-0000-01F0-0009-8490-6303-0134
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
  State:
    ONLINE to the other controller
    PREFERRED_PATH = THIS_CONTROLLER
    Host based logging NOT specified
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
  LUN ID:          6000-1FE1-0000-01F0-0009-8490-6303-0135
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
  State:
    ONLINE to the other controller
    PREFERRED_PATH = THIS_CONTROLLER
    Host based logging NOT specified
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
```

```

NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to the other controller
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
  Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
D10                                MIR_DLOG
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0181
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE                  NOWRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  None
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Host based logging NOT specified
  Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```



3. Create association sets and then add the log unit, if desired. For information on how to create association sets, with or without write history logging, see Appendix C.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---



4. When you have created the association set, verify it with the following CLI command:

```
SHOW ASSOCIATION_SETS FULL
```

You will see a display similar to that in Example Display 22.

### Example Display 22

```

BuildngATop> show as_d1
Name          Association          Uses          Used by
-----
AS_D1         association          RCS1
Switches:
  NOFAIL_ALL
  NOORDER_ALL
  LOG_UNIT = D10 (No data logged)

```



5. If you changed an asynchronous remote copy set to synchronous during failover, change it back to asynchronous mode by issuing the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = ASYNCHRONOUS
```

Example: `set rcs1 operation_mode = asynchronous`

Repeat this step for all applicable remote copy sets.



6. Re-enable failsafe mode, if desired. To set failsafe mode, enter the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: set rcs1 error\_mode = failsafe

Repeat this step for all applicable remote copy sets.

---

**Note:** Failsafe cannot be set if the remote copy set is in an association set that will be used for write history logging.

---



7. When you are ready to return to your original initiator, enable access to the initiator site host by using the following CLI command:

```
SET UnitName ENABLE = InitiatorHostConnectionNamex,  
InitiatorHostConnectionNamey
```

Example: set d1 enable = hosta1,hosta2



8. Allow hosts to recognize new units. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.

If the initiator site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```

- b. **HP Tru64 UNIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the initiator site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where x is the SCSI bus number.

- c. **HP-UX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:

```
ioscan -fnCdisk
```

```
mount -a
```

- d. **IBM AIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:

```
cfgmgr -v
```

```
mount all
```

- e. **Microsoft Windows NT-X86:** Reboot the hosts at the initiator site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.
- f. **Microsoft Windows 2000:**
  - 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.
    - a) On each host, log in using an account that has administrative privileges.
    - b) Open **Computer Management** and click **Disk Management**.
    - c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.
  - 2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.
- g. **Novell NetWare:** If the initiator site hosts are shut down, boot them now. Booting the hosts allows Novell NetWare to recognize the drives.

If the initiator site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.
- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u  
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]  
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes the short duration planned failover with fast failback.



# Resumption of Replication After Short Planned Loss of Target Procedure

## 6

This chapter contains the procedures needed to resume replication after a short duration planned communication loss at the target:

- [Suspend Remote Copy Sets for Target Site Shutdown](#), page 82
- [Target Site Shutdown](#), page 86
- [Resume Remote Copy Sets When Target Site Is Back Up](#), page 86

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol ⑥ in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

## Procedure for Planned Loss of Target During Short Maintenance Period

In this situation you will be bringing the target site down for planned maintenance. The remote copy sets are in failsafe mode. The duration of the outage at the target is relatively short (up to several hours). You will not be performing failover or failback, but you will resume replication after the target site is operational and back online.

Use this procedure when the error mode of the remote copy set is set for failsafe and the target site will be temporarily shut down. Setting the error mode of the remote copy set to normal allows host I/O to continue while the target site is offline. Enabling write logging prevents the need for a full copy as long as the log unit does not have enough time to fill up.

### Suspend Remote Copy Sets for Target Site Shutdown

This procedure ceases write operations to the target.



1. Verify that the remote copy sets have error modes set to failsafe with the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 1](#).

#### Example Display 1

```
BuildngATop> SHOW REMOTE_COPY_SETS FULL
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = FAILSAFE
  FAILOVER_MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
```



2. Set the error mode of all remote copy set to normal mode with the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = NORMAL
```

Example: set rcs1 error\_mode = normal

Repeat this step for all remote copy sets.



3. Create a mirrorset for the log disk by issuing the following CLI command:

```
ADD MIRRORSET MirrorsetName DiskName1 DiskName2
```

Example: add mirr mir\_dllog disk50100 disk60100

**Note:** To minimize the number of devices used for logging, you can create and use one-member mirrorsets. Because the data will be written to one disk, the logged data will not be protected. However, all of this data is also written to the initiator unit. In the case of a log disk failure, you would incur a full normalization, rather than a mini-merge, when access to the target is re-established.

The command to create a one-member mirrorset is the same as above, except only one disk is listed.

Example: `add mirr mir_d1log disk50100`.

If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.



4. Initialize the mirrorset with the following CLI command:

```
INITIALIZE ContainerName
```

Example: `initialize mir_d1log`



5. Verify that you have created a mirrorset by issuing the following CLI command:

```
SHOW MIRRORSET
```

You will see a display similar to that in [Example Display 2](#).

### Example Display 2

Name	Storageset	Uses	Used by
MIR_D1LOG	<b>mirrorset</b>	DISK50100 DISK60100	



6. Present the log unit to the controller with the following CLI command:

```
ADD UNIT UnitName ContainerName
```

Example: `add unit d10 mir_d1log`



7. Verify that the controller recognizes the log unit by issuing the following CLI command:

```
SHOW UNITS
```

You will see a display similar to that in [Example Display 3](#).

### Example Display 3

LUN	Uses	Used by
D10	MIR_D1LOG	



8. Disable node access to the log unit with the following CLI command:

```
SET UnitNumber DISABLE_ACCESS_PATH = ALL
```

Example: `set d10 disable_access_path = all`



9. Disable writeback cache with the following CLI command:

```
SET UnitNumber NOWRITEBACK_CACHE
```

Example: `set d10 nowriteback_cache`



10. Check to see that you have disabled access and writeback cache with the following command:

```
SHOW D10
```

You will see a display similar to that in [Example Display 4](#).

#### Example Display 4

LUN	Uses	Used by
-----		
D10	MIR_D1LOG	
LUN ID:	6000-1FE1-0001-3B10-0009-9130-8044-0066	
IDENTIFIER = 10		
Switches:		
RUN	NOWRITE_PROTECT	READ_CACHE
READAHEAD_CACHE	<b>NOWRITEBACK_CACHE</b>	
MAXIMUM_CACHED_TRANSFER_SIZE = 32		
Access:		
<b>None</b>		
State:		
ONLINE to this controller		
Not reserved		
PREFERRED_PATH = THIS CONTROLLER		
Host based logging NOT specified		
Size:	35556389 blocks	
Geometry (C/H/S):	( 7000 / 20 / 254 )	



11. Create an association set with the following CLI command:

```
ADD ASSOCIATIONS AssociationSetName RemoteCopySetName
```

Example: add associations as\_d1 rcs1

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

You can add additional members to the association set by issuing the following CLI command:

```
SET AssociationSetName ADD = RemoteCopySetName
```

---



12. Assign the log unit to the association set with the following CLI command:

```
SET AssociationSetName LOG_UNIT = D10
```

Example: set as\_d1 log\_unit = d10



13. Check to see the switch status of the association set by issuing the following CLI command:

```
SHOW AssociationSetName
```

Example: show as\_d1

You will see a display similar to that in [Example Display 5](#).

## Example Display 5

```

Name                Association                Uses                Used by
-----
association          RC_D1
Switches:
  NOFAIL_ALL
  NOORDER_ALL
LOG_UNIT = D10 (No data logged)

```



14. Use the following CLI command to verify that the remote copy set's error mode is set to normal, that it uses an association set, and to obtain the TargetName\UnitName from the target state:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 6](#).

## Example Display 6

```

BuildngATop> SHOW REMOTE_COPY_SETS FULL
Name                Uses                Used by
-----
RCS1                remote copy          D1                AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL

```



15. Suspend write operations to the target site with the following CLI command:

```
SET RemoteCopySetName SUSPEND = TargetName\UnitName
```

Example: set rcs1 suspend = buildngb\d1

Repeat this step for all remote copy sets.

You will see a confirmation message, as shown in [Example Display 7](#).

## Example Display 7

```

%EVL--BuildngATop> --07-JUN-2001 11:51:01-- Instance Code: 0E210064
Template: 144.(90)
.
.
.
Instance Code: 0E210064

```



16. Use the following CLI command to verify that the remote copy sets are suspended and that the log unit is available:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 8](#).

## Example Display 8

```
BuildngATop> SHOW REMOTE_COPY_SETS FULL
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is SUSPENDED      LOG_UNIT 96% available
```

## Target Site Shutdown

- ① 1. If necessary for the type of maintenance being performed, shut down the controllers at the target site. The procedure for site shutdown is contained in Appendix B.
- ② 2. Continue the resumption of operations with the following procedure for resuming remote copy sets.
- ③ 3. Power up the target site if it was powered off. The procedure for site power-up is contained in Appendix B.

## Resume Remote Copy Sets When Target Site Is Back Up

- 1. Once the target site is back up, look for a confirmation message, as shown in [Example Display 9](#).

### Example Display 9

```
BuildngATop>
%EVL--BuildngATop> --07-JUN-2001 12:08:20-- Instance Code: 0E120064
Template: 144.(90)
.
.
.
Instance Code: 0E120064
```

- 2. Resume write operations to the target site with this CLI command:

```
SET RemoteCopySetName RESUME = TargetName\UnitName
```

Example: set rcs1 resume = buildnbg\d1

Repeat this step for all remote copy sets.

- 3. After you have completed this command, you will see a confirmation message, as shown in [Example Display 10](#).

### Example Display 10

```
%EVL--BuildngATop> --07-JUN-2001 12:09:41-- Instance Code: 0E220064
Template: 144.(90)
.
.
.
Instance Code: 0E220064
```



4. Use the following CLI command to verify that the remote copy sets are merging:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 11](#).

### Example Display 11

```
BuildngATop> SHOW REMOTE_COPY_SETS FULL
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is MERGING              1% complete
```



5. Once the merge has completed, you will see a confirmation message, as shown in [Example Display 12](#).

### Example Display 12

```
BuildngATop>
%EVL--BuildngATop> --07-JUN-2001 12:11:49-- Instance Code: 0E110064
Template: 144.(90)
.
.
.
Instance Code: 0E110064
```



6. Use the following CLI command to verify that the target state of the remote copy set is set to NORMAL:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 13](#).

### Example Display 13

```
BuildngATop> SHOW REMOTE_COPY_SETS FULL
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
```

---

**Note:** Wait for normalization on all remote copy sets to complete before proceeding.

---

7. Turn off write history logging with the following CLI command:
- ```
SET AssociationSetName NOLOG_UNIT
```
- Example: `set as_d1 nolog_unit`
8. Use the following CLI command to verify that the association sets have no log unit:
- ```
SHOW ASSOCIATION FULL
```
- You will see a display similar to that in [Example Display 14](#).

### Example Display 14

```
BuildngATop> SHOW ASSOCIATION FULL
Name          Association          Uses          Used by
-----
AS_D1         association          RCS1
Switches:
  NOFAIL_ALL
  NOORDER_ALL
  NOLOG_UNIT
```

9. If you have configured an association set, remove it now with the following CLI command:
- ```
DELETE AssociationSetName
```
- Example: `delete as_d1`
10. Set the error mode of the remote copy set back to failsafe with the following CLI command:
- ```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```
- Example: `set rcs1 error_mode = failsafe`
- Repeat this step for all remote copy sets.
11. Use the following CLI command to verify that the error mode of the remote copy set is set back to failsafe:
- ```
SHOW REMOTE_COPY_SETS FULL
```
- You will see a display similar to that in [Example Display 15](#).

### Example Display 15

```
BuildngATop> SHOW REMOTE_COPY_SETS FULL
Name          Uses          Used by
-----
RCS1          remote copy    D1          AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR_MODE    = FAILSAFE
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
```

This completes the procedure for resumption of operations after a planned loss of target for a short maintenance period.



# Extended Planned Site Failover with Full Failback Procedure

## 7

In this situation you will be performing planned maintenance at the initiator site. The maintenance will not be completed within a relatively short period of time. You will perform a failover to the target site. Because of the longer duration of the planned outage, the write history log will not be able to accommodate the accumulated reads and writes. Because the write history log cannot capture all host I/O, when the initiator is operational and back online, you will perform a full failback to the initiator.

This chapter contains the following procedures to ensure that failover and subsequent failback performed for initiator site maintenance function properly:

- [Planned Site Failover](#), page 90
- [Maintenance Completion](#), page 101
- [Maintenance Failback](#), page 105

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol ① in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

## Planned Site Failover

Use Planned Site Failover when the initiator site will be undergoing maintenance. Planned Site Failover consists of the following procedures:

- Initiator Site Preparation Procedure
- Target Site Failover Procedure
- Target Host Setup Procedure

### Initiator Site Preparation Procedure

- ▶ 1. Before performing the failover procedure, locate your record of SHOW command output that details the current initiator configuration. Verify that your target controller configuration is the same as your initiator controller configuration. Compare the status of the controllers, association sets, remote copy sets, units, and connections. Appendix A contains the full procedure.
- ▶ 2. Verify that all remote copy sets are in normal state. Issue the following CLI command:  

```
SHOW REMOTE_COPY_SETS FULL
```

The output shows the status of remote copy sets.

You will see a display similar to that in [Example Display 1](#).

#### Example Display 1

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
RCS2      remote copy              D2
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D2) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D2      is NORMAL
```

- ▶ 3. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the operating system is up and running, and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.

- b. **HP Tru64 UNIX:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all file system LUNs that have remote copy sets that will be failed over.
- c. **HP-UX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
- d. **IBM AIX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
- e. **Microsoft Windows NT-X86:** If the operating system is up and running, shut it down and power off the hosts.
- f. **Microsoft Windows 2000:** If the operating system is up and running, shut it down and power off the hosts.
- g. **Novell NetWare:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.



**Caution:** If you are using NWCS, failure to enter the following two commands will cause all cluster nodes to abend.

If you are using NWCS, you must enter the `cluster down` command. You must also enter the `uldnscs` (unload NetWare Cluster Services) command for all cluster nodes.

- h. **Sun Solaris:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all volumes that have remote copy sets that will be failed over.



4. If your remote copy sets are set for asynchronous operation mode, switch to synchronous mode using the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = SYNCHRONOUS
```

Example: `set rcs1 operation_mode = synchronous`

Repeat this step for all applicable remote copy sets.



5. Turn off write history logging, if enabled, with the following CLI command:

```
SET AssociationSetName NOLOG_UNIT
```

Example: `set as_d1 nolog_unit`

Repeat this step for each applicable association set.



6. If you have association sets, delete them with the following CLI command:

```
DELETE AssociationSetName
```

Example: `delete as_d1`

Repeat this step for each applicable association set.



7. Disable host access to the remote copy set units with the following CLI command:

**Note:** Do not disable access to the target connection.

```
SET UnitName DISABLE = InitiatorHostConnectionNamex,
InitiatorHostConnectionNamey
```

Example: set d1 disable = hosta1,hosta2

Repeat this step for all remote copy set units.



8. Each remote copy set unit should have four connections enabled to TargetRemoteCopyNameA, TargetRemoteCopyNameB, TargetRemoteCopyNameC, and TargetRemoteCopyNameD.

- a. To see the connections, enter the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 2](#).

### Example Display 2

```
BuildngATop> show units full
LUN                                     Uses                               Used by
-----
D1                                     DISK10000                          BUILDNGA\RCS1
  LUN ID:          6000-1FE1-0000-01F0-0009-8490-6303-0134
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = THIS_CONTROLLER
    Host based logging NOT specified
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                     DISK20000                          BUILDNGA\RCS2
  LUN ID:          6000-1FE1-0000-01F0-0009-8490-6303-0135
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = OTHER_CONTROLLER
    Host based logging NOT specified
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
```

- b. If access to the target site controllers is not currently enabled, enable access by issuing the following command for each applicable remote copy set unit:

```
SET UnitName ENABLE = TargetRemoteCopyNameA,
TargetRemoteCopyNameB, TargetRemoteCopyNameC, TargetRemoteCopyNameD
```

Example: set d1 enable = buildngbA,buildngbB,buildngbC, buildngbD



9. Set the maximum cached transfer size to 128 with the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: `set d1 maximum_cached_transfer_size = 128`

Repeat this step for all remote copy set units.

---

**Note:** This command sets both the read and write maximum cached transfer size.

---



10. If you need to shut down the initiator controllers, proceed with the following CLI commands (in this order):

```
SHUTDOWN OTHER_CONTROLLER
```

```
SHUTDOWN THIS_CONTROLLER
```



11. After the preceding command has completed and both controllers have shut down successfully, power off the controller rack. See Appendix B for the power-down procedure.

If the initiator site will be powered down for a long period of time, you may need to disable cache batteries.



12. Continue the Planned Failover at the target site with the Target Site Failover Procedure.

## Target Site Failover Procedure



1. At the target site, the remote copy set units must be preferred to one controller or the other.
  - a. Use the following CLI command to check for the preferred path:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 3](#).

### Example Display 3

```
BuildngBTop> show units full
LUN                                     Uses                               Used by
-----
D1                                     DISK10000                         BUILDNGA\RCS1
LUN ID:                               6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Target NORMAL
Size:                               17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                     DISK20000                         BUILDNGA\RCS2
LUN ID:                               6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
```

```

MAX_READ_CACHED_TRANSFER_SIZE = 128
MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
  Target NORMAL
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```

- b. If remote copy set units are not currently preferred, use the following CLI command:

```
SET UnitName PREFERRED_PATH = THIS_CONTROLLER
```

Example: set d1 preferred\_path = this\_controller

or

```
SET UnitName PREFERRED_PATH = OTHER_CONTROLLER
```

Example: set d2 preferred\_path = other\_controller

Repeat this step for each remote copy set unit that needs to be preferred.



2. Disconnect controller access with the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```

```
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```



3. Verify controller access disconnection with the following CLI commands:

```
SHOW THIS_CONTROLLER
```

```
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 4](#).

### Example Display 4

```

BuildngBTop> show this_controller
Controller:
  HSG80 ZG84906303 Software V87P, Hardware E03
  NODE_ID = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG84906237
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 17:55:29
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F3
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 220213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F4
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY = BUILDNGB
.
.
.
BuildngBTop> show other_controller
Controller:
  HSG80 ZG84906237 Software V87P, Hardware E03
  NODE_ID = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG84906303
  In dual-redundant configuration
  Device Port SCSI address 6
  Time: 10-MAY-2001 17:55:39
  Command Console LUN is lun 0 (NOIDENTIFIER)

```

```

Host PORT_1:
    Reported PORT_ID = 5000-1FE1-0000-01F1
    PORT_1_TOPOLOGY = FABRIC (fabric up)
    Address          = 250213
Host PORT_2:
    Reported PORT_ID = 5000-1FE1-0000-01F2
    PORT_2_TOPOLOGY = OFFLINE (offline)
    REMOTE_COPY = BUILDNGA
.
.
.

```



4. Move the initiator role to the target with the following CLI command:

```
SITE_FAILOVER InitiatorRemoteCopyName\RemoteCopySetName
```

Example: `site_failover buildngA\rcl1`

---

**Note:** The *InitiatorRemoteCopyName* is the remote copy name of the original initiator.

---

You will see a confirmation message, as shown in [Example Display 5](#).

### Example Display 5

```

BuildngBTop> site_failover buildngA\rcl1

%EVL--BuildngBTop> --10-MAY-2001 15:47:39-- Instance Code: 0E010064
Template: 144.(90)
.
.
.
Instance Code: 0E010064

```

Repeat this step for each remote copy set.



5. Remove the targets with the following CLI command:

```
SET RemoteCopySetName REMOVE = InitiatorRemoteCopyName\UnitNumber
```

Example: `set rcl1 remove = buildngA\d1`

You will see a confirmation message, as shown in [Example Display 6](#).

---

**Note:** Removing the targets will cause the target LUN WWIDs to revert to what they were when originally created, and not be the initiator LUN WWIDs used with the remote copy sets.

---

### Example Display 6

```

BuildngBTop> set rcl1 remove=buildngA\d1

%EVL--BuildngBTop> --10-MAY-2001 16:49:55-- Instance Code: 0E078A01
Template: 144.(90)
.
.
.
Instance Code: 0E078A01

```

Repeat this step for each remote copy set.



6. To restore the connections to the target site, issue the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

```
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```



## 7. Verify connection restoration with the following CLI commands:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 7](#).

### Example Display 7

```
BuildngBTop> show this_controller
Controller:
  HSG80 ZG94115654 Software V87P, Hardware E10
  NODE_ID = 5000-1FE1-0000-4250
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG94319198
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 17:34:11
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-4253
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 260213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4254
  PORT_2_TOPOLOGY = FABRIC (fabric up)
  Address = 260413
  REMOTE_COPY = BUILDNGB
.
.
.
BuildngBTop> show other_controller
Controller:
  HSG80 ZG94319198 Software V87P, Hardware E10
  NODE_ID = 5000-1FE1-0000-4250
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG94115654
  In dual-redundant configuration
  Device Port SCSI address 6
  Time: 10-MAY-2001 17:34:20
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-4251
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 200213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4252
  PORT_2_TOPOLOGY = FABRIC (fabric up)
  Address = 200413
  REMOTE_COPY = BUILDNGB
.
.
.
```

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---

Repeat this step for each applicable association set. You can set up write history logging after you add targets back to the configuration, later in this chapter.



## 8. Continue the Planned Failover at the target site with the Target Host Setup Procedure.



## Target Host Setup Procedure

1. If you wish, you can enhance host I/O performance by resetting the maximum cached transfer size to the value used on the initiator. Obtain your record of `SHOW` command output that details the original initiator configuration. Using the output as a reference, set the maximum cached transfer size to the original initiator value using the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: `set d1 maximum_cached_transfer_size = 32`

Repeat this step for each remote copy set unit.

---

**Note:** The default maximum cached transfer size is 32.

---

2. Enable host access to all remote copy set units at the target site with the following CLI command:

```
SET UnitName ENABLE = TargetHostConnectionNamex,  
TargetHostConnectionNamey
```

Example: `set d1 enable = hostb1,hostb2`

You will see a display similar to that in [Example Display 8](#).

### Example Display 8

```
BuildngBTop> set d1 enable=hostb1,hostb2  
Warning 1000: Other host(s) in addition to the one(s) specified can still  
              access this unit. If you wish to enable ONLY the host(s)  
              specified, disable all access paths (DISABLE_ACCESS=ALL), then  
              again enable the ones specified
```

Repeat this step for each remote copy set unit.

3. If you do not recall a target host connection name, use the following command:

```
SHOW CONNECTIONS
```

You will see a display similar to that in [Example Display 9](#).

### Example Display 9

```
BuildngBTop> show connections
```

| Connection<br>Name | Operating system                              | Controller | Port | Address                                  | Status   | Unit<br>Offset |
|--------------------|-----------------------------------------------|------------|------|------------------------------------------|----------|----------------|
| BUILDNGAA          | PPRC_TARGET<br>HOST_ID=5000-1FE1-0000-01F0    | THIS       | 2    | ADAPTER_ID=5000-1FE1-0000-01F4           | offline  | 0              |
| BUILDNGAB          | PPRC_TARGET<br>HOST_ID=5000-1FE1-0000-01F0    | OTHER      | 2    | ADAPTER_ID=5000-1FE1-0000-01F2           | offline  | 0              |
| BUILDNGAC          | PPRC_INITIATOR<br>HOST_ID=5000-1FE1-0000-01F0 | THIS       | 2    | 220413<br>ADAPTER_ID=5000-1FE1-0000-01F4 | OL this  | 0              |
| BUILDNGAD          | PPRC_INITIATOR<br>HOST_ID=5000-1FE1-0000-01F0 | OTHER      | 2    | 250413<br>ADAPTER_ID=5000-1FE1-0000-01F2 | OL other | 0              |
| HOSTA1             | WINNT<br>HOST_ID=1000-0000-C920-A7B9          | THIS       | 1    | 260013<br>ADAPTER_ID=1000-0000-C920-A7B9 | OL this  | 0              |
| HOSTA2             | WINNT<br>HOST_ID=1000-0000-C921-3F4E          | OTHER      | 1    | 200013<br>ADAPTER_ID=1000-0000-C921-3F4E | OL other | 0              |

|               |                             |       |   |                                |          |   |
|---------------|-----------------------------|-------|---|--------------------------------|----------|---|
| <b>HOSTB1</b> | WINNT                       | THIS  | 1 | 220013                         | OL this  | 0 |
|               | HOST_ID=1000-0000-C921-3E98 |       |   | ADAPTER_ID=1000-0000-C921-3E98 |          |   |
| <b>HOSTB2</b> | WINNT                       | OTHER | 1 | 250013                         | OL other | 0 |
|               | HOST_ID=1000-0000-C921-3EFC |       |   | ADAPTER_ID=1000-0000-C921-3EFC |          |   |



4. Verify access to the target site hosts with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 10](#).

### Example Display 10

```
BuildngBTop> show units full
```

| LUN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Uses      | Used by       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------|
| D1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | DISK10000 | BUILDNGB\RCS1 |
| LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E<br>NOIDENTIFIER<br>Switches:<br>RUN NOWRITE_PROTECT READ_CACHE<br>READAHEAD_CACHE WRITEBACK_CACHE<br>MAX_READ_CACHED_TRANSFER_SIZE = 32<br>MAX_WRITE_CACHED_TRANSFER_SIZE = 32<br>Access:<br>BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD, <b>HOSTB1, HOSTB2</b><br>State:<br>ONLINE to this controller<br>Not reserved<br>PREFERRED_PATH = THIS_CONTROLLER<br>Host based logging NOT specified<br>Size: 17769177 blocks<br>Geometry (C/H/S): ( 5258 / 20 / 169 )  |           |               |
| D2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | DISK20000 | BUILDNGB\RCS2 |
| LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003F<br>NOIDENTIFIER<br>Switches:<br>RUN NOWRITE_PROTECT READ_CACHE<br>READAHEAD_CACHE WRITEBACK_CACHE<br>MAX_READ_CACHED_TRANSFER_SIZE = 32<br>MAX_WRITE_CACHED_TRANSFER_SIZE = 32<br>Access:<br>BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD, <b>HOSTB1, HOSTB2</b><br>State:<br>ONLINE to this controller<br>Not reserved<br>PREFERRED_PATH = OTHER_CONTROLLER<br>Host based logging NOT specified<br>Size: 17769177 blocks<br>Geometry (C/H/S): ( 5258 / 20 / 169 ) |           |               |

In the Access field of the display, all units that are used by remote copy sets will show that both the target host and the initiator controller connections are enabled.



5. Allow hosts to recognize new units. Some operating systems may require a remapping of the initiator LUN WWIDs to the target LUN WWIDs caused by the removal of the remote copy sets. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the target site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.  
  
If the target site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:  
  

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```
  - b. **HP Tru64 UNIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the target site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where x is the SCSI bus number.

c. **HP-UX:**

- 1) If the target site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the target site hosts are not shut down, use the following command to enable HP-UX to recognize the drives and verify that they are present. This command will display only the previously configured failed-over LUNs:

```
ioscan -fnCdisk
```

- 2) Continue with the following commands to access file systems on new failed-over LUNs. If you have no new failed-over LUNs, skip these substeps and go directly to the next step to mount the LUNs:

a) `/opt/CPQswsp/spmgr display -u`

b) `/opt/CPQswsp/spmgr add WWN`

Repeat this command for each un-attached WWN that was displayed.

c) `/ioscan -fnCdisk`

If the device special files were not displayed, run `insf -e`, then run `ioscan -fnCdisk` again.

d) `/vgimport VolumeGroupName DeviceSpecialFile`

Repeat this command for each new failed-over LUN.

- 3) Use the following command to mount the LUNs:

```
mount -a
```

---

**Note:** *VolumeGroupName* is the name of the volume group you originally created at the initiator site. The *DeviceSpecialFiles* are from the `ioscan` in the form of `/dev/dsk/c_t_d_`.

For consistency, configure the same *DeviceSpecialFiles* with the same volume groups, logical volumes, and file systems for the failed-over LUNs at the target site with the same LUNs at the initiator site.

---

- d. **IBM AIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the target site hosts are not shut down, use the following commands to enable AIX to recognize the drives and verify that they are present:

```
cfgmgr -v
```

```
lsdev -Cc disk
```

Use the following commands to access file systems on the failed-over LUNs:

```
importvg -y volumegroupname hdiskx
mount all
```

---

**Note:** *volumegroupname* is the name of the volume group you originally created at the initiator site, and *x* is the number of the hdisk assigned to the failed-over LUN. If the *-y volumegroupname* parameter is omitted, AIX will create a default volume group name for you, for example, *vg00*.

---

- e. **Microsoft Windows NT-X86:** Reboot the hosts at the target site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.
- f. **Microsoft Windows 2000:**
  - 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.
    - a) On each host, log in using an account that has administrative privileges.
    - b) Open **Computer Management** and click **Disk Management**.
    - c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed-over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.
  - 2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.
- g. **Novell NetWare:** If the target site hosts are shut down, boot them now. If you are using traditional NetWare volumes, booting the hosts allows Novell NetWare to recognize the drives and automatically mount the volumes. If you are using NSS logical volumes, booting the hosts will recognize the NSS pools and activate them. However, you must manually mount each individual NSS volume by typing `MOUNT VolumeName` at the NetWare console.

If the target site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.

Next, mount the volumes with these commands:

```
MOUNT ALL (for traditional NetWare volumes)
MOUNT VolumeName (for NSS logical volumes).
```

- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v
disks
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]
drvconfig -v
disks
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes Planned Failover. Stop at this point.

---

**Note:** Proceed with the following Maintenance Completion only after the maintenance work on the initiator controller is completed and the targets are ready to be added back in.

---

## Maintenance Completion

Compare the status of the controllers, association sets, remote copy sets, units, and connections at the target site with those at the initiator site. A full procedure is detailed in Appendix A. Make sure any status change is reflected on the target. To compare status, bring up a terminal emulator session and enter a `SHOW THIS` command.

Maintenance Completion consists of the following procedures:

- Initiator Site Preparation Procedure
- Target Site Copy Data Procedure

### Initiator Site Preparation Procedure

- ▶ 1. Power up the controllers, if necessary. See Appendix B for the power-up procedure.
- ▶ 2. Check all units for lost data with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 11](#).

## Example Display 11

```
BuildngATop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000                          Buildnga\RCS1
LUN ID:                          6000-1FE1-0007-9DD0-0009-0510-3907-000C
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  INOPERATIVE
  Unit has lost data
  UNKNOWN - Unit is no longer an initiator
  PREFERRED_PATH = THIS_CONTROLLER
  WRITE_PROTECT - DATA SAFETY
Size:                               NOT YET KNOWN
Geometry (C/H/S): NOT YET KNOWN
```

- a. If there are units with lost data, clear the data for each applicable unit, with the following CLI command:

```
CLEAR_ERRORS UnitName LOST_DATA
```

Example: `clear_errors d1 lost_data`

- b. Verify that all the lost data has been cleared with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 12](#). If the lost data has been cleared, the display will indicate that the unit is ONLINE.

## Example Display 12

```
BuildngATop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000                          BUILDNGA\RCS1
LUN ID:                          6000-1FE1-0000-01F0-0009-8490-6303-0134
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFR_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to the other controller
  UNKNOWN - Unit is no longer an initiator
  PREFERRED_PATH = THIS_CONTROLLER
Size:                               17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```



3. Delete all remote copy sets with following CLI command:

```
DELETE RemoteCopySetName
```

Example: `delete rcs1`

You will see a confirmation message, as shown in [Example Display 13](#).

## Example Display 13

```
BuildngATop> delete rcs1

%EVL--BuildngATop> --10-MAY-2001 18:01:12-- Instance Code: 0E020064
Template: 144.(90)
.
.
Instance Code: 0E020064
```

Repeat this step for each remote copy set.



4. Continue with Maintenance Completion at the target site with the Target Site Copy Data Procedure.

## Target Site Copy Data Procedure

This section describes how to copy the data from the target site to the initiator site. It starts the process, which is continued in the [Maintenance Failback](#) section.



1. If you changed an asynchronous remote copy set to synchronous during failover, change it back to asynchronous mode by issuing the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = ASYNCHRONOUS
```

Example: set rcs1 operation\_mode = asynchronous

Repeat this step for all applicable remote copy sets.



2. Add back the target to the initiator unit's remote copy sets with the following CLI command:

```
SET RemoteCopySetName ADD = InitiatorRemoteCopyName\UnitName
```

Example: set rcs1 add = buildngA\d1

You will see a confirmation message, as shown in [Example Display 14](#).

## Example Display 14

```
BuildngBTop> set rcs1 add = BuildngA\d1

%EVL--BuildngBTop> --10-MAY-2001 17:37:27-- Instance Code: 0E050064
Template: 144.(90)
.
.
Instance Code: 0E050064
```

Repeat this step for all remote copy sets.



3. Enter the following command to see the percentage of completion.

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 15](#).

## Example Display 15

```
BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGA\D1      is COPYING                               94% complete

BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGA\D1      is NORMAL
```

When the units are all normalized, the Target state field of the display will show NORMAL.

---

**Note:** Wait for normalization on all remote copy sets to complete before you proceed.

---



- If you plan to leave load running, you may now add write history logging to your association sets.

---

**Note:** For information on how to add write history logging to association sets, see Appendix C.

---



- If you plan to leave load running, and your application requires failsafe mode, set failsafe mode with the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: set rcs1 error\_mode = failsafe

---

**Note:** Failsafe cannot be set if the remote copy set is in an association set that will be used for write history logging.

---

This completes Maintenance Completion. The next section describes how to perform Maintenance Failback.



## Maintenance Failback

Maintenance Failback consists of the following procedures:

- Continuation of Target Site Copy Data Procedure
- Initiator Site Return Control Procedure
- Target Site Restore Procedure
- Initiator Site Restoration of Target Connections Procedure



**Caution:** The system must be in a failed over condition from the initiator site to the target site before beginning this procedure.

## Continuation of Target Site Copy Data Procedure

This section continues the description that began in the [Maintenance Completion](#) section of how to copy the data from the target site to the initiator site.

1. Stop I/O from the target hosts to the remote copy set units.
2. Disable host access to all units used by remote copy sets at the target site, with the following CLI command:

```
SET UnitName DISABLE = TargetHostConnectionNameX,  
TargetHostConnectionNameY
```

Example: set d1 disable = hostb1,hostb2

3. Verify removal of host access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 16](#).

### Example Display 16

```
BuildngBTop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000                          BUILDNGB\RCS1
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
D2                                DISK20000                          BUILDNGB\RCS2
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
```

```

Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
Size:      17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```

4. If your remote copy sets are set for asynchronous operation mode, switch to synchronous mode using the following CLI command:  

```
SET RemoteCopySetName OPERATION_MODE = SYNCHRONOUS
```

 Example: `set rcs1 operation_mode = synchronous`  
 Repeat this step for all remote copy sets.
5. Continue Maintenance Failback at the initiator site with the Initiator Site Return Control Procedure, in the next section.

## Initiator Site Return Control Procedure

This section describes how to return Data Replication Manager control to the initiator site.

1. Disconnect controller access with the following CLI commands:  

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```
2. Verify that controller access was successfully disconnected by issuing the following CLI commands:  

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

 You will see a display similar to that in [Example Display 17](#).

### Example Display 17

```

BuildngATop> show this_controller
Controller:
  HSG80 ZG84906303 Software V87P, Hardware E03
  NODE_ID      = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS = 0
  SCSI_VERSION  = SCSI-3
  Configured for MULTIBUS FAILOVER with ZG84906237
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 17:55:29
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F3
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address          = 220213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F4
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY     = BUILDNGA
.
.
.
BuildngATop> show other_controller
Controller:
  HSG80 ZG84906237 Software V87P, Hardware E03
  NODE_ID      = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS = 0
  SCSI_VERSION  = SCSI-3
  Configured for MULTIBUS FAILOVER with ZG84906303
  In dual-redundant configuration

```

```

Device Port SCSI address 6
Time: 10-MAY-2001 17:55:39
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F1
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address         = 250213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F2
  PORT_2_TOPOLOGY = OFFLINE (offline)
  REMOTE_COPY = BUILDNGA
.
.
.

```



3. Fail back the initiator role to the initiator site with the following CLI command:

```
SITE_FAILOVER TargetRemoteCopyName\RemoteCopySetName
```

Example: `site_failover buildngB\rsc1`

You will see a confirmation message, as shown in [Example Display 18](#).

### Example Display 18

```

%EVL--BuildngATop> --10-MAY-2001 17:57:17-- Instance Code: 0E010064
Template: 144.(90)
.
.
.
Instance Code: 0E010064

```

Repeat this step for each remote copy set.



4. Continue Maintenance Failback at the target site with the Target Site Restore Procedure.

## Target Site Restore Procedure



1. Turn off write history logging, if enabled, with the following CLI command:

```
SET AssociationSetName NOLOG_UNIT
```

Example: `set as_d1 nolog_unit`

Repeat this procedure for each association set.



2. Delete the association set with the following CLI command:

```
DELETE AssociationSetName
```

Example: `delete as_d1`

Repeat this procedure for each association set.



3. Delete all remote copy sets with following CLI command:

```
DELETE RemoteCopySetName
```

Example: `delete rcs1`

You will see a confirmation message, as shown in [Example Display 19](#).

### Example Display 19

```

BuildngBTop> delete rcs1

%EVL--BuildngBTop> --10-MAY-2001 18:01:12-- Instance Code: 0E020064
Template: 144.(90)
.
.
.
Remote Copy Set Name: "RCS1"

```



- Set the maximum cached transfer size to 128 with the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: set d1 maximum\_cached\_transfer\_size = 128

Repeat this step for all initiator remote copy set units.

---

**Note:** This command sets both the read and write maximum cached transfer size.

---



- Verify that maximum cached transfer size was set to 128 with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 20](#).

### Example Display 20

```
BuildngBTop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  PREFERRED_PATH = THIS CONTROLLER
  Host based logging NOT specified
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                DISK20000
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to the other controller
  PREFERRED_PATH = OTHER_CONTROLLER
  Host based logging NOT specified
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```



- Continue Maintenance Failback at the initiator site with the Initiator Site Restoration of Target Connections Procedure.

## Initiator Site Restoration of Target Connections Procedure

This section describes how to restore all target connections from the initiator site.



- To restore the connections to the target site, enter the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

```
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

You will see a confirmation message, as shown in [Example Display 21](#).

## Example Display 21

```
%EVL--BuildngATop> --10-MAY-2001 18:05:11-- Instance Code: 0E120064
Template: 144.(90)
.
.
.
Instance Code: 0E120064
```



2. Enter the following commands to verify that the connections have been restored:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 22](#).

## Example Display 22

```
BuildngATop> show this_controller
Controller:
HSG80 ZG84906303 Software V87P, Hardware E03
NODE_ID = 5000-1FE1-0000-01F0
ALLOCATION_CLASS = 0
SCSI_VERSION = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG84906237
In dual-redundant configuration
Device Port SCSI address 7
Time: 10-MAY-2001 18:05:38
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-01F3
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address = 220213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-01F4
PORT_2_TOPOLOGY = FABRIC (fabric up)
Address = 220413
REMOTE_COPY = BUILDNGA
.
.
.
BuildngATop> show other_controller
Controller:
HSG80 ZG84906237 Software V87P, Hardware E03
NODE_ID = 5000-1FE1-0000-01F0
ALLOCATION_CLASS = 0
SCSI_VERSION = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG84906303
In dual-redundant configuration
Device Port SCSI address 6
Time: 10-MAY-2001 18:05:48
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-01F1
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address = 250213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-01F2
PORT_2_TOPOLOGY = FABRIC (fabric up)
Address = 250413
REMOTE_COPY = BUILDNGA
.
.
.
```

- ▶ 3. Re-enable failsafe mode, if desired. To set failsafe mode, enter the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: `set rcs1 error_mode = failsafe`

Repeat this step for all applicable remote copy sets.

---

**Note:** Failsafe cannot be set if the remote copy set is in an association set that will be used for write history logging.

---

- ▶ 4. If you changed an asynchronous remote copy set to synchronous during failover, change it back to asynchronous mode with the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = ASYNCHRONOUS
```

Example: `set rcs1 operation_mode = asynchronous`

Repeat this step for all applicable remote copy sets.

- ▶ 5. Create association sets and then add the log unit, if desired. For information on how to create association sets, with or without write history logging, see Appendix C.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---

Verify the log units with the following command:

```
SHOW ASSOCIATIONS FULL
```

You will see a display similar to that in [Example Display 23](#).

### Example Display 23

```
BuildngATop> show associations full
Name      Association      Uses      Used by
-----
AS_D1     association      RCS1
          RCS2
          Switches:
          NOFAIL ALL
          NOORDER ALL
          LOG_UNIT = D10 (No data logged)
```

- ▶ 6. Enable host access to all units used by remote copy sets at the initiator site, with the following CLI command:

```
SET UnitName ENABLE = InitiatorHostConnectionNamex,
InitiatorHostConnectionNamey
```

Example: `set d1 enable = hosta1,hosta2`

- ▶ 7. Verify that the initiator host can connect to the remote copy set units with this command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 24](#). In the Access field of the display, all remote copy set units will show that the initiator hosts are enabled.

## Example Display 24

```

BuildngATop> show units full
      LUN                               Uses                               Used by
-----
D1
  LUN ID:          6000-1FE1-0000-01F0-0009-8490-6303-0134
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD,  HOSTA1,  HOSTA2
  State:
    ONLINE to the other controller
    PREFERRED_PATH = THIS CONTROLLER
    Host based logging NOT specified
  Size:          17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

D2
  LUN ID:          6000-1FE1-0000-01F0-0009-8490-6303-0135
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD  HOST A1,  HOSTA2
  State:
    ONLINE to the other controller
    PREFERRED_PATH = OTHER CONTROLLER
    Host based logging NOT specified
  Size:          17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

```



8. Obtain your record of SHOW command output that details the original initiator configuration. Using the output as a reference, set the maximum cached transfer size to the original initiator value using the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: set d1 maximum\_cached\_transfer\_size = 32

Repeat this step for all remote copy set units.

---

**Note:** The default setting for maximum\_cache\_transfer\_size is 32.

---



9. Allow hosts to recognize new units. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.  
  
If the initiator site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:  
  
MCR SYSMAN IO AUTOCONFIGURE/LOG
  - b. **HP Tru64 UNIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the initiator site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where x is the SCSI bus number.

- c. **HP-UX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:

```
ioscan -fnCdisk
```

```
mount -a
```

- d. **IBM AIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:

```
cfgmgr -v
```

```
mount all
```

- e. **Microsoft Windows NT-X86:** Reboot the hosts at the initiator site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.

- f. **Microsoft Windows 2000:**

- 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.

- a) On each host, log in using an account that has administrative privileges.

- b) Open **Computer Management** and click **Disk Management**.

- c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.

- 2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.

- g. **Novell NetWare:** If the initiator site hosts are shut down, boot them now. Booting the hosts allows Novell NetWare to recognize the drives.

If the initiator site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.



- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u  
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]  
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes the Extended Planned Site Failover with Full Failback.



# Resumption of Replication After Extended Planned Loss of Target Procedure (Failsafe Mode)

## 8

Use this procedure when the error mode of the remote copy sets is set for failsafe and the target site will be shut down for an extended length of time. Setting the remote copy set's error mode to normal allows host I/O to continue while the target site is offline. Because there is no log unit configured, a full copy will be performed once the target site is back online.

Every command in this procedure should be performed only for those remote copy sets in your configuration with error mode set to failsafe.

This chapter contains the following procedures for resuming replication due to an extended loss of the target:

- [Prepare Remote Copy Sets](#), page 116
- [Target Site Availability](#), page 117
- [Resume Remote Copy Set Operation](#), page 117

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol ① in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

## Prepare Remote Copy Sets



1. Use the following CLI command to verify that the error mode of the remote copy sets is set to failsafe:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 1](#).

### Example Display 1

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = FAILSAFE
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
```



2. Set the error mode of the remote copy sets to normal with the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = NORMAL
```

Example: set rcs1 error\_mode = normal

Repeat this step for all applicable remote copy sets.



3. Use the following CLI command to verify that the error mode of the remote copy sets is normal:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 2](#).

### Example Display 2

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
```



4. Remove the targets with the following CLI command:

```
SET RemoteCopySetName REMOVE = TargetRemoteCopyName\UnitName
```

Example: set rcs1 remove = buildngB\d1

You will see a confirmation message, as shown in [Example Display 3](#).

### Example Display 3

```
BuildngATop> set rcs1 remove = buildngB\d1
%EVL--BuildngATop> --10-MAY-2001 16:49:55-- Instance Code: 0E078A01
Template: 144.(90)
.
.
.
Instance Code: 0E078A01
```

Repeat this step for all applicable remote copy sets.



5. Verify that you have removed the targets by entering the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 4](#).

### Example Display 4

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE   = SYNCHRONOUS
  ERROR MODE       = NORMAL
  FAILOVER MODE    = MANUAL
  OUTSTANDING_IOS  = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to the other controller
No targets
```

## Target Site Availability



The target site is now available for desired actions.



When the target site is operational and back on line, continue resumption of operations with the [Resume Remote Copy Set Operation](#) procedure. If the target site must be powered off, follow the procedure in Appendix B.

## Resume Remote Copy Set Operation



1. If you are connected to the initiator site controllers when the target site comes online, you will see the following confirmation messages, as shown in [Example Display 5](#).

## Example Display 5

```

BuildngATop>

%EVL--BuildngATop> --07-JUN-2001 14:16:15-- Instance Code: 07050064
Template: 5.(05)
Power On Time: 2. Years, 73. Days, 6. Hours, 50. Minutes, 57. Seconds
Event reported by Peer to Peer Remote Copy target controller
Controller Model: HSG80
Serial Number: ZG94115654 Hardware Version: E10(28)
Software Version: V87P
Instance Code: 07050064
Last Failure Code: 08090010 (No Last Failure Parameters)

%EVL--BuildngATop> --07-JUN-2001 14:16:15-- Instance Code: 43010064
Template: 4.(04)
Power On Time: 2. Years, 73. Days, 6. Hours, 50. Minutes, 57. Seconds
Event reported by Peer to Peer Remote Copy target controller
Controller Model: HSG80
Serial Number: ZG94115654 Hardware Version: E10(28)
Software Version: V87P
Other Controller Serial Number: ZG94319198
Failed Controller Target Number: 0.(00)
LUNs Taken By This Controller:
00000003
00000000
00000000
00000000
00000000
00000000
00000000
00000000
00000000
00000000
Instance Code: 43010064

```



2. Add back the target to the initiator unit's remote copy sets with the following CLI command:

```
SET RemoteCopySetName ADD = TargetRemoteCopyName\UnitName
```

Example: set rcs1 add = buildingB\d1

You will see a confirmation message, as shown in [Example Display 6](#).

## Example Display 6

```

BuildngATop> set rcs1 add=buildingB\d1

%EVL--BuildngATop> --10-MAY-2001 17:37:27-- Instance Code: 0E050064
Template: 144.(90)
.
.
.
Instance Code: 0E050064

```

Repeat this step for all applicable remote copy sets.

---

**Note:** This command will cause the remote copy sets to begin normalization.

---



3. Enter the following command to see the percentage of normalization completion for all remote copy sets.

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 7](#).

## Example Display 7

```

BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGB\D1      is COPYING                               94% complete

BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to the other controller
Target state:
  BUILDNGB\D1      is NORMAL

```

When the units are all normalized, the Target field of the display will show NORMAL, as shown in the lower half of the example display.

---

**Note:** Wait for normalization on all remote copy sets to complete before you proceed.

---



- Set the error mode of the remote copy sets to failsafe with the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: set rcs1 error\_mode = failsafe

Repeat this step for all applicable remote copy sets.



- Use the following CLI command to verify that the error modes of the remote copy sets are set to failsafe:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 8](#).

## Example Display 8

```

BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = FAILSAFE
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL

```

This completes the procedure for resuming of operations after an extended planned loss of the target.



# Unplanned Site Failover with Failback to New Hardware Procedure

## 9

In this scenario a disaster of some type of disaster (lightening, flood, fire, or the like) has damaged the initiator site. You will perform an unplanned site failover to the target site. When the damaged components at the initiator site (hosts, controllers, switches, for example) have been repaired, and the site is operational and back online, you will perform a failback to the new hardware.

This chapter contains the following procedures to ensure that an unplanned failover and subsequent failback function properly:

- [Unplanned Failover](#), page 122
- [New Hardware Failback](#), page 132

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol Ⓢ in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

## Unplanned Failover

Use the Unplanned Failover in this section in conjunction with the New Hardware Failback procedures whenever a situation occurs at the initiator site to bring it down (unable to perform its functions as an initiator).

## Target Site Failover Procedure

**Note:** Because the initiator may be running (and perhaps write history logging), you must ensure that:

- The intersite connections are severed.
- You do not restore the connection until directed to do so in the proper failback procedure.



1. Verify that the intersite connections are severed with the following CLI command:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 1](#).

### Example Display 1

```
BuildngBTop> show this_controller
Controller:
  HSG80 ZG94115654 Software V87P, Hardware E10
  NODE_ID = 5000-1FE1-0000-4250
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG94319198
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 16:41:11
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-4253
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 260213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4254
  PORT_2_TOPOLOGY = FABRIC (connection down)
  Address = 260413
  REMOTE_COPY = BUILDNGB
.
.
.
BuildngBTop> show other_controller
Controller:
  HSG80 ZG94319198 Software V87P, Hardware E10
  NODE_ID = 5000-1FE1-0000-4250
  ALLOCATION_CLASS = 0
  SCSI_VERSION = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG94115654
  In dual-redundant configuration
  Device Port SCSI address 6
  Time: 10-MAY-2001 16:43:12
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-4251
  PORT_1_TOPOLOGY = FABRIC (fabric up)
  Address = 200213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4252
  PORT_2_TOPOLOGY = FABRIC (connection down)
  REMOTE_COPY = BUILDNGB
.
.
.
```

- 2. Ensure that the connection between sites is not restored by entering the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```

- 3. Verify the lack of connection with the following CLI commands:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 2](#).

### Example Display 2

```
BuildngBTop> show this_controller
Controller:
HSG80 ZG94115654 Software V87P, Hardware E10
NODE_ID = 5000-1FE1-0000-4250
ALLOCATION_CLASS = 0
SCSI_VERSION = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG94319198
In dual-redundant configuration
Device Port SCSI address 7
Time: 10-MAY-2001 16:42:49
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-4253
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address = 260213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-4254
PORT_2_TOPOLOGY = OFFLINE (offline)
REMOTE_COPY = BUILDNGB
.
.
.
BuildngBTop> show other_controller
Controller:
HSG80 ZG94319198 Software V87P, Hardware E10
NODE_ID = 5000-1FE1-0000-4250
ALLOCATION_CLASS = 0
SCSI_VERSION = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG94115654
In dual-redundant configuration
Device Port SCSI address 6
Time: 10-MAY-2001 16:43:12
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-4251
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address = 200213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-4252
PORT_2_TOPOLOGY = OFFLINE (offline)
REMOTE_COPY = BUILDNGB
.
.
.
```

- 4. At the target site, the remote copy set units must be preferred to one controller or the other.
  - a. Use the following CLI command to check for the preferred path:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 3](#).

### Example Display 3

```

BuildngBTop> show units full
      LUN                               Uses                               Used by
-----
D1
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 128
    MAX_WRITE_CACHED_TRANSFER_SIZE = 128
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
  State:
    ONLINE to the other controller
    PREFERRED_PATH = THIS_CONTROLLER
    Target NORMAL
  Size:          17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003F
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = OTHER_CONTROLLER
    Target NORMAL
  Size:          17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

```

- b. If the remote copy set units are not currently preferred, use the following CLI command:

```
SET UnitName PREFERRED_PATH = THIS_CONTROLLER
```

Example: set d1 preferred\_path = this\_controller

or

```
SET UnitName PREFERRED_PATH = OTHER_CONTROLLER
```

Example: set d2 preferred\_path = other\_controller

Repeat this step for each remote copy set unit that needs to be preferred.



5. Use the following CLI command to fail over each remote copy set (maximum of 12 per subsystem):

```
SITE_FAILOVER InitiatorRemoteCopyName\RemoteCopySetName
```

Example: site\_failover buildngA\rcl1

You will see a confirmation message, as shown in [Example Display 4](#).

### Example Display 4

```

BuildngBTop> site_failover buildngA\rcl1

%EVL--BuildngBTop> --10-MAY-2001 16:48:08-- Instance Code: 0E010064
  Template: 144.(90)
.
.
.
Instance Code: 0E010064

```

Repeat this step for all remote copy sets.



- Remove the targets with the following CLI command:

```
SET RemoteCopySetName REMOVE = InitiatorRemoteCopyName\UnitNumber
```

Example: set rcs1 remove = buildngA\d1

You will see a confirmation message, as shown in [Example Display 5](#).

---

**Note:** Removing the targets will cause the target LUN WWIDs to revert to what they were when originally created, and not be the initiator LUN WWIDs used with the remote copy sets.

---

### Example Display 5

```
BuildngBTop> set rcs1 remove=buildngA\d1

%EVL--BuildngBTop> --10-MAY-2001 16:49:55-- Instance Code: 0E078A01
Template: 144.(90)
.
.
.
Instance Code: 0E078A01
```

Repeat this step for all remote copy sets.



- Verify the removal of the targets with the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 6](#).

### Example Display 6

```
BuildngBTop> show remote_copy_sets full
Name                               Uses          Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION MODE   = SYNCHRONOUS
  ERROR MODE       = NORMAL
  FAILOVER MODE    = MANUAL
  OUTSTANDING IOS  = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to the other controller
  Not reserved
  No targets
```

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---

Repeat this step for each applicable association set. You can set up write history logging after targets are added back to the configuration later in this chapter.



- Enable host access to all remote copy set units at the target site with the following CLI command:

```
SET UnitName ENABLE = TargetHostConnectionNamex,
TargetHostConnectionNamey
```

Example: set d1 enable = hostb1,hostb2

You will see a display similar to that in [Example Display 7](#).

## Example Display 7

```
BuildngBTop> set d1 enable=hostb1,hostb2
Warning 1000: Other host(s) in addition to the one(s) specified can still
              access this unit. If you wish to enable ONLY the host(s)
              specified, disable all access paths (DISABLE_ACCESS=ALL), then
              again enable the ones specified
```

Repeat this step for each remote copy set unit.



9. If you do not recall a target host connection name, use the following command:

```
SHOW CONNECTIONS
```

You will see a display similar to that in [Example Display 8](#).

## Example Display 8

```
BuildngBTop> show connections
Connection
Name      Operating system      Controller  Port   Address  Status  Unit
Offset
BUILDNGAA      PPRC_TARGET          THIS        2      offline  0
HOST_ID=5000-1FE1-0000-01F0  ADAPTER_ID=5000-1FE1-0000-01F4
BUILDNGAB      PPRC_TARGET          OTHER        2      offline  0
HOST_ID=5000-1FE1-0000-01F0  ADAPTER_ID=5000-1FE1-0000-01F2
BUILDNGAC      PPRC_INITIATOR       THIS        2      220413   offline  0
HOST_ID=5000-1FE1-0000-01F0  ADAPTER_ID=5000-1FE1-0000-01F4
BUILDNGAD      PPRC_INITIATOR       OTHER        2      250413   offline  0
HOST_ID=5000-1FE1-0000-01F0  ADAPTER_ID=5000-1FE1-0000-01F2
HOSTA1         WINNT                THIS        1      260013   OL this  0
HOST_ID=1000-0000-C920-A7B9  ADAPTER_ID=1000-0000-C920-A7B9
HOSTA2         WINNT                OTHER        1      200013   OL other 0
HOST_ID=1000-0000-C921-3F4E  ADAPTER_ID=1000-0000-C921-3F4E
HOSTB1         WINNT                THIS        1      220013   OL this  0
HOST_ID=1000-0000-C921-3E98  ADAPTER_ID=1000-0000-C921-3E98
HOSTB2         WINNT                OTHER        1      250013   OL other 0
HOST_ID=1000-0000-C921-3EFC  ADAPTER_ID=1000-0000-C921-3EFC
```



10. Verify the target site hosts' access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 9](#).

## Example Display 9

```

BuildngBTop> show units full
      LUN                               Uses                               Used by
-----
D1
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = THIS_CONTROLLER
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003F
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = OTHER_CONTROLLER
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

```

In the Access field of the display, all units that are used by remote copy sets will show that both the target host and the initiator controller connections are enabled.



11. If you wish, you can enhance host I/O performance by resetting the maximum cached transfer size to the original value used on the initiator. Obtain your record of SHOW command output that details the original initiator configuration. Using the output as a reference, set the maximum cached transfer size to the original initiator value using the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: set d1 maximum\_cached\_transfer\_size = 32

Repeat this step for all remote copy set units.



12. Verify that you have set the maximum cached transfer size to 32 with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 10](#).

## Example Display 10

```

BuildngBTop> show units full
      LUN                               Uses                               Used by
-----
D1
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
  State:
    ONLINE to the other controller
    PREFERRED_PATH = THIS_CONTROLLER
    Host based logging NOT specified
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003F
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = OTHER_CONTROLLER
    Target NORMAL
  Size:              17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

```

---

**Note:** The default value for maximum cached transfer size is 32.

---



13. If, while performing failover, you decided to create a new unit protected by a new remote copy set, use the following CLI command:

```
ADD_REMOTE_COPY_SETS RemoteCopySetName UnitName
```

Example: add\_remote\_copy\_sets rcs3 d3

The target will be added at failback.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---



14. Allow hosts to recognize new units. Some operating systems may require a remapping of the initiator LUN WWIDs to the target LUN WWIDs caused by the removal of the remote copy sets. Follow the steps listed below for each operating system in your heterogeneous configuration:
- HP OpenVMS:** If the target site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.



If the target site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```

- b. **HP Tru64 UNIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the target site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where x is the SCSI bus number.

- c. **HP-UX:**

- 1) If the target site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the target site hosts are not shut down, use the following command to enable HP-UX to recognize the drives and verify that they are present. This command will display only the previously configured failed-over LUNs:

```
ioscan -fnCdisk
```

- 2) Continue with the following commands to access file systems on new failed-over LUNs. If you have no new failed-over LUNs, skip these substeps and go directly to the next step to mount the LUNs:

a) `/opt/CPQswsp/spmgr display -u`

b) `/opt/CPQswsp/spmgr add WWN`

Repeat this command for each un-attached WWN that was displayed.

c) `ioscan -fnCdisk`

If the device special files were not displayed, run `insf -e`, then run `ioscan -fnCdisk` again.

d) `vgimport VolumeGroupName DeviceSpecialFile`

Repeat this command for each new failed-over LUN.

- 3) Use the following command to mount the LUNs:

```
mount -a
```

---

**Note:** *VolumeGroupName* is the name of the volume group you originally created at the initiator site. The *DeviceSpecialFiles* are from the `ioscan` in the form of `/dev/dsk/c_t_d_`.

For consistency, configure the same *DeviceSpecialFiles* with the same volume groups, logical volumes, and file systems for the failed-over LUNs at the target site with the same LUNs at the initiator site.

---

- d. **IBM AIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the target site hosts are not shut down, use the following commands to enable AIX to recognize the drives and verify that they are present:

```
cfgmgr -v  
lsdev -Cc disk
```

Use the following commands to access file systems on the failed-over LUNs:

```
importvg -y volumegroupname hdiskx  
mount all
```

---

**Note:** *volumegroupname* is the name of the volume group you originally created at the initiator site, and *x* is the number of the hdisk assigned to the failed-over LUN. If the *-y volumegroupname* parameter is omitted, AIX will create a default volume group name for you, for example, *vg00*.

---

- e. **Microsoft Windows NT-X86:** Reboot the hosts at the target site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.
- f. **Microsoft Windows 2000:**
  - 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.
    - a) On each host, log in using an account that has administrative privileges.
    - b) Open **Computer Management** and click **Disk Management**.
    - c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.
  - 2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.
- g. **Novell NetWare:** If the target site hosts are shut down, boot them now. If you are using traditional NetWare volumes, booting the hosts allows Novell NetWare to recognize the drives and automatically mount the volumes. If you are using NSS logical volumes, booting the hosts will recognize the NSS pools and activate them. However, you must manually mount each individual NSS volume by typing MOUNT *VolumeName* at the NetWare console.

If the target site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.

Next, mount the volumes with these commands:

```
MOUNT ALL (for traditional NetWare volumes)  
MOUNT VolumeName (for NSS logical volumes).
```

- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u  
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]  
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes the Unplanned Failover. When the initiator systems have been replaced, or the problems that disabled the initiator site have been remedied, continue with New Hardware Failback in the next section.

## New Hardware Failback

Use New Hardware Failback when *any storage hardware at the initiator site has been replaced*, and the *new hardware is not configured*.

The New Hardware Failback consists of the following procedures:

- Initiator Site Preparation Procedure
- Target Site Preparation Procedure
- Initiator Site Connections Procedure
- Target Site Copy Data Procedure
- Initiator Site Return Control Procedure
- Target Site Restore Procedure
- Initiator Site Restoration of Target Connections Procedure

### Initiator Site Preparation Procedure



1. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the operating system is up and running, and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.
  - b. **HP Tru64 UNIX:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all file system LUNs that have remote copy sets that will be failed over.
  - c. **HP-UX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
  - d. **IBM AIX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
  - e. **Microsoft Windows NT-X86:** If the operating system is up and running, shut it down and power off the hosts.
  - f. **Microsoft Windows 2000:** If the operating system is up and running, shut it down and power off the hosts.
  - g. **Novell NetWare:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.



**Caution:** If you are using NWCS, failure to enter the following two commands will cause all cluster nodes toabend.

---

If you are using NWCS, you must enter the `cluster down` command. You must also enter the `uldnscs` (unload NetWare Cluster Services) command for all cluster nodes.

- h. **Sun Solaris:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all volumes that have remote copy sets that will be failed over.



2. Obtain your record of `SHOW` command output that details the original initiator configuration. Using the output as a reference, manually reconfigure the controllers, but do not re-create the original remote copy sets.

---

**Note:** Performing [step c](#), [step f](#), or [step g](#) will cause the controller pair to restart.

---

- a. Set node ID and checksum for THIS controller. This information can be found on the original initiator controller rack. See the *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Configuration User Guide* for information on the node ID and checksum.

The node ID for the OTHER controller will be set automatically by the command in [step c](#).

- b. **HP OpenVMS only:** Set the device ID to its previous value with the following command:

```
SET THIS IDENTIFIER = Value
```

Example: `set this identifier = 98`

Verify the identifier setting with the following command:

```
SHOW THIS_CONTROLLER
```

You will see a display similar to that in [Example Display 11](#).

### Example Display 11

```
HSG> show this_controller
Controller:
HSG80 ZG84906303 Software V87P, Hardware E03
NODE_ID           = 5000-1FE1-0000-01F0
ALLOCATION_CLASS   = 0
SCSI_VERSION      = SCSI-2
Not configured for dual-redundancy
Device Port SCSI address 7
Time: 11-MAY-2001 11:41:36
Command Console LUN is lun 0 (IDENTIFIER = 98)
.
.
.
```

- c. Configure the controllers for multiple bus failover mode by issuing the following CLI command:

```
SET MULTIBUS_FAILOVER COPY = THIS_CONTROLLER
```

This command will automatically restart the OTHER controller.

- d. (Optional) Set the controller to the preferred SCSI mode with the following CLI command:

```
SET THIS_CONTROLLER SCSI_VERSION = SCSI-x
```

where x = 2 or 3.

SCSI-2 is the default setting.

---

**Note:** Do not restart the controller.

---

- e. Designate a controller prompt with the following CLI commands:

```
SET THIS_CONTROLLER PROMPT= "InitiatorControllerNameTop> "
```

Example: set this\_controller prompt = "buildngA Top> "

```
SET OTHER_CONTROLLER PROMPT="InitiatorControllerNameBottom> "
```

Example: set other\_controller prompt = "buildngA Bottom> "

- f. Set mirrored cache using the following CLI command:

```
SET THIS_CONTROLLER MIRRORED_CACHE
```

---

**Note:** This CLI command may fail because internal cache diagnostics are running. These diagnostics can take up to 5 minutes to complete, so you may need to retry this command.

---

- g. Enter the following command:

```
SET THIS_CONTROLLER REMOTE_COPY = InitiatorRemoteCopyName
```

Example: set this\_controller remote\_copy = buildngA

---

**Note:** The *InitiatorRemoteCopyName* must be the same as on the original controller hardware configuration

If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---



- h. Run the *Configuration* utility to assign a disk name to physical disks with the following CLI command:

```
RUN CONFIG
```

You will see a display similar to that in [Example Display 12](#).

## Example Display 12

```
BuildngATop> run config

Config Local Program Invoked

Config is building its tables and determining what devices exist
on the subsystem. Please be patient.

add disk DISK10000    1 0 0
add disk DISK10100    1 1 0
add disk DISK10200    1 2 0
add disk DISK10300    1 3 0
add disk DISK20000    2 0 0
add disk DISK20100    2 1 0
add disk DISK20200    2 2 0
add disk DISK20300    2 3 0
add disk DISK30000    3 0 0
add disk DISK30100    3 1 0
add disk DISK30200    3 2 0
add disk DISK30300    3 3 0
add disk DISK40000    4 0 0
add disk DISK40300    4 3 0
add disk DISK50000    5 0 0
add disk DISK50300    5 3 0
add disk DISK60000    6 0 0
add disk DISK60300    6 3 0
```

Config - Normal Termination

- i. Using the configuration data from the target, create and initialize all storagesets and units. This includes all that had existed at the initiator site as well as those that were created at the target site since failover. The units that will be part of remote copy sets must be identical to the corresponding units at the target site. Wait to create any units that will be used for log disks until later in the chapter. See the *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Configuration Guide* for information on creating storagesets and units.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---

- j. Verify the creation of the storagesets and units with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 13](#).

## Example Display 13

```

BuildingATop> show units full
      LUN                               Uses                Used by
-----
D1
  LUN ID:          6000-1FE1-0000-01F0-0009-8490-6303-0134
  NOIDENTIFIER
  Switches:
    RUN                               NOWRITE_PROTECT        READ_CACHE
    READAHEAD_CACHE                   WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    All
  State:
    ONLINE to this controller
    Not reserved
    NOPREFERRED_PATH
  Size:          17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
  LUN ID:          6000-1FE1-0000-01F0-0009-8490-6303-0135
  NOIDENTIFIER
  Switches:
    RUN                               NOWRITE_PROTECT        READ_CACHE
    READAHEAD_CACHE                   WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    All
  State:
    ONLINE to this controller
    Not reserved
    NOPREFERRED_PATH
  Size:          17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

```

- k. **HP OpenVMS only:** Use the following command to set each unit's device identifier to the value it was prior to hardware replacement:

```
SET UnitName IDENTIFIER = Value
```

Example: set d1 identifier = 1

This becomes the VMS device identifier for DGx1.



3. Disable all access to the units with the following CLI command:

```
SET UnitName DISABLE = ALL
```

Example: set d1 disable = all

Repeat this step for each unit.



4. Verify the disabled access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 14](#).



## Example Display 14

```

BuildingATop> show units full
LUN                               Uses                               Used by
-----
D1                                DISK10000
LUN ID:        6000-1FE1-0000-01F0-0009-8490-6303-0134
IDENTIFIER = 1
Switches:
  RUN                               NOWRITE_PROTECT           READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  None
State:
  ONLINE to this controller
  Not reserved
  NOPREFERRED_PATH
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
D2                                DISK20000
LUN ID:        6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT           READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  None
State:
  ONLINE to this controller
  Not reserved
  NO PREFERRED_PATH
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```



5. At the initiator site, the units must be preferred to one controller or the other.
  - a. Check for preference with the following CLI command. Use the same preference rules as used at the target:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 15](#).

## Example Display 15

```

BuildingATop> show units full
LUN                               DISK10000
D1                                DISK10000
LUN ID:        6000-1FE1-0000-01F0-0009-8490-6303-0134
IDENTIFIER = 1
Switches:
  RUN                               NOWRITE_PROTECT           READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  None
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS CONTROLLER
Size:        17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
D2                                DISK20000
LUN ID:        6000-1FE1-0000-01F0-0009-8490-6303-0135
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT           READ_CACHE
  READAHEAD_CACHE                   WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  None
State:

```

```

        ONLINE to this controller
        Not reserved
        PREFERRED_PATH = OTHER_CONTROLLER
        Size:                17769177 blocks
        Geometry (C/H/S): ( 5258 / 20 / 169 )

```

- b. If the units need to be preferred, use the following command:

```
SET UnitName PREFERRED_PATH = THIS_CONTROLLER
```

Example: set d1 preferred\_path = this\_controller

or

```
SET UnitName PREFERRED_PATH = OTHER_CONTROLLER
```

Example: set d2 preferred\_path = other\_controller



6. Set the maximum cached transfer size to 128 with the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: set d1 maximum\_cached\_transfer\_size = 128

Repeat this step for each remote copy set unit.

---

**Note:** This command sets both the read and write maximum cached transfer size.

---



7. Enable Port 1 and Port 2 connections to the fabric with the following CLI commands:

```
SET THIS_CONTROLLER PORT_1_TOPOLOGY = FABRIC
```

```
SET OTHER_CONTROLLER PORT_1_TOPOLOGY = FABRIC
```

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

```
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```



8. Compare the status of the controllers, association sets, remote copy sets, units, and connections at the target site with those at the initiator site. A full procedure is detailed in Appendix A. Make sure any status change is reflected on the target. To compare status, bring up a terminal emulator session and enter the following commands.

```
SHOW THIS_CONTROLLER
```

```
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 16](#).

### Example Display 16

```

BuildngATop> show this_controller
Controller:
  HSG80 ZG84906303 Software V87P, Hardware E03
  NODE_ID           = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS    = 0
  SCSI_VERSION       = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG84906237
    In dual-redundant configuration
  Device Port SCSI address 7
  Time: 11-MAY-2001 12:04:30
  Command Console LUN is lun 0 (IDENTIFIER = 99)
Host PORT_1:
  Reported PORT_ID   = 5000-1FE1-0000-01F3
  PORT_1_TOPOLOGY    = FABRIC (fabric up)
  Address            = 220213
Host PORT_2:
  Reported PORT_ID   = 5000-1FE1-0000-01F4
  PORT_2_TOPOLOGY    = FABRIC (fabric up)
  Address            = 220413
  REMOTE_COPY        = BUILDNGA

```

```

Cache:
    256 megabyte write cache, version 0012
    Cache is GOOD
    No unflushed data in cache
    CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
Mirrored Cache:
    256 megabyte write cache, version 0012
    Cache is GOOD
    No unflushed data in cache
Battery:
    NOUPS
    FULLY CHARGED
    Expires:                11-MAY-2003

BuildngATop> show other_controller
Controller:
    HSG80 ZG84906237 Software V87P, Hardware E03
    NODE_ID                = 5000-1FE1-0000-01F0
    ALLOCATION_CLASS        = 0
    SCSI_VERSION           = SCSI-3
    Configured for MULTIBUS_FAILOVER with ZG84906303
    In dual-redundant configuration
    Device Port SCSI address 6
    Time: 11-MAY-2001 12:08:17
    Command Console LUN is lun 0 (IDENTIFIER = 99)
Host PORT_1:
    Reported PORT_ID = 5000-1FE1-0000-01F1
    PORT_1_TOPOLOGY = FABRIC (fabric up)
    Address          = 250213
Host PORT_2:
    Reported PORT_ID = 5000-1FE1-0000-01F2
    PORT_2_TOPOLOGY = FABRIC (fabric up)
    Address          = 250413
    REMOTE_COPY = BUILDNGA
Cache:
    256 megabyte write cache, version 0012
    Cache is GOOD
    No unflushed data in cache
    CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
Mirrored Cache:
    256 megabyte write cache, version 0012
    Cache is GOOD
    No unflushed data in cache
Battery:
    NOUPS
    FULLY CHARGED
    Expires:                11-MAY-2003

```



9. Continue the New Hardware Failback at the target site with the Target Site Preparation Procedure.

## Target Site Preparation Procedure

This section describes how to prepare the target site for failback and create connections from the initiator site to the target.



1. Disable initiator controller access to all remote copy set units by issuing the following command:

```

SET UnitName DISABLE = InitiatorRemoteCopyNameA,
InitiatorRemoteCopyNameB, InitiatorRemoteCopyNameC,
InitiatorRemoteCopyNameD

```

Example: `set d1 disable = buildngAA,buildngAB,buildngAC,buildngAD`

Repeat this step for each remote copy set unit.



2. Verify the lack of controller access to the remote copy set with the following CLI command:

```

SHOW UNITS FULL

```

You will see a display similar to that in [Example Display 17](#).

### Example Display 17

```
BuildngBTop> show units full
LUN
-----
D1
LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN              NOWRITE_PROTECT      READ_CACHE
  READAHEAD_CACHE  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  HOSTB1, HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Target NORMAL
Size:              17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN              NOWRITE_PROTECT      READ_CACHE
  READAHEAD_CACHE  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  HOSTB1,          HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
Size:              17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

3. Delete the connections to the original controllers at the initiator site using the following CLI commands:

```
DELETE InitiatorRemoteCopyNameA
```

Example: delete buildngAA

```
DELETE InitiatorRemoteCopyNameB
```

Example: delete buildngAB

```
DELETE InitiatorRemoteCopyNameC
```

Example: delete buildngAC

```
DELETE InitiatorRemoteCopyNameD
```

Example: delete buildngAD

4. Verify the deletions with the following CLI command:

```
SHOW CONNECTIONS
```

You will see a display similar to that in [Example Display 18](#).

## Example Display 18

```
BuildngBTop> show connections
Connection
Name           Operating system      Controller  Port   Address      Status      Unit
Offset
HOSTA1          WINNT                 THIS        1      260013      OL this      0
HOST_ID=1000-0000-C920-A7B9      ADAPTER_ID=1000-0000-C920-A7B9
HOSTA2          WINNT                 OTHER        1      200013      OL other      0
HOST_ID=1000-0000-C921-3F4E      ADAPTER_ID=1000-0000-C921-3F4E
HOSTB1          WINNT                 THIS        1      220013      OL this      0
HOST_ID=1000-0000-C921-3E98      ADAPTER_ID=1000-0000-C921-3E98
HOSTB2          WINNT                 OTHER        1      250013      OL other      0
HOST_ID=1000-0000-C921-3EFC      ADAPTER_ID=1000-0000-C921-3EFC
```

The only access to the target units will now be from the hosts.

- 5. To enable the connections to the initiator site, enter the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

- 6. Verify that the connections were enabled with the following CLI commands:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 19](#).

## Example Display 19

```
BuildngBTop> show this_controller
Controller:
HSG80 ZG94115654 Software V87P, Hardware E10
NODE_ID          = 5000-1FE1-0000-4250
ALLOCATION_CLASS  = 0
SCSI_VERSION     = SCSI-3
Configured for MULTIBUS FAILOVER with ZG94319198
In dual-redundant configuration
Device Port SCSI address 7
Time: 11-MAY-2001 12:36:15
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-4253
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address          = 260213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-4254
PORT_2_TOPOLOGY = FABRIC (fabric up)
Address          = 260413
REMOTE_COPY      = BUILDNGB
.
.
.
BuildngBTop> show other_controller
Controller:
HSG80 ZG94319198 Software V87P, Hardware E10
NODE_ID          = 5000-1FE1-0000-4250
ALLOCATION_CLASS  = 0
SCSI_VERSION     = SCSI-3
Configured for MULTIBUS FAILOVER with ZG94115654
In dual-redundant configuration
Device Port SCSI address 6
Time: 10-MAY-2001 16:43:12
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-4251
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address          = 200213
```

```

Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-4252
  PORT_2_TOPOLOGY = FABRIC (fabric up)
  REMOTE_COPY = BUILDNGB
.
.
.

```

---

**Note:** Restore the intersite connections at this time.

---

7. Establish the connections to the initiator site with the following CLI command:

```
ADD REMOTE_COPY_SETS RCS199 D199 InitiatorRemoteCopyName\D199
```

Example: add remote\_copy\_sets rcs199 d199 buildngA\d199

---

**Note:** This command will report as failed with the following error message: Error: Initiator Unit specified not found. However, it creates and names the connections appropriately.

---

8. Verify the connections with the following CLI command:

```
SHOW CONNECTIONS
```

You will see a display similar to that in [Example Display 20](#).

### Example Display 20

```

BuildngBTop> show connections
Connection
  Name      Operating system  Controller  Port  Address      Status  Unit
Offset
BUILDNGAA  PPRC_TARGET          THIS        2      offline      0
HOST_ID=5000-1FE1-0000-01F0 ADAPTER_ID=5000-1FE1-0000-01F4
BUILDNGAB  PPRC_TARGET          OTHER        2      offline      0
HOST_ID=5000-1FE1-0000-01F0 ADAPTER_ID=5000-1FE1-0000-01F2
BUILDNGAC  PPRC_INITIATOR        THIS        2      offline      0
HOST_ID=5000-1FE1-0000-01F0 ADAPTER_ID=5000-1FE1-0000-01F4
BUILDNGAD  PPRC_INITIATOR        OTHER        2      offline      0
HOST_ID=5000-1FE1-0000-01F0 ADAPTER_ID=5000-1FE1-0000-01F2
HOSTA1     WINNT                 THIS        1      260013      OL this    0
HOST_ID=1000-0000-C920-A7B9 ADAPTER_ID=1000-0000-C920-A7B9
HOSTA2     WINNT                 OTHER        1      200013      OL other   0
HOST_ID=1000-0000-C921-3F4E ADAPTER_ID=1000-0000-C921-3F4E
HOSTB1     WINNT                 THIS        1      220013      OL this    0
HOST_ID=1000-0000-C921-3E98 ADAPTER_ID=1000-0000-C921-3E98
HOSTB2     WINNT                 OTHER        1      250013      OL other   0
HOST_ID=1000-0000-C921-3EFC ADAPTER_ID=1000-0000-C921-3EFC

```

9. Continue the New Hardware Failback at the initiator site with the Initiator Site Connections Procedure.

## Initiator Site Connections Procedure

This section describes how to create initiator site connections to the target.



1. Establish connection to the target site with the following CLI command:

```
ADD REMOTE_COPY_SETS RCS199 D199 TargetRemoteCopyName\D199
```

Example: add remote\_copy\_sets rcs199 d199 buildngB\d199

---

**Note:** This command will report as failed with the following error message: Error: Initiator Unit specified not found. However, it creates and names the connections appropriately.

---



2. Verify the connections with the following CLI command:

```
SHOW CONNECTIONS
```

You will see a display similar to that in [Example Display 21](#).

### Example Display 21

```
BuildngABottom> show connections
```

| Connection Name | Operating system            | Controller                     | Port | Address | Status   | Unit Offset |
|-----------------|-----------------------------|--------------------------------|------|---------|----------|-------------|
| !NEWCON00       | WINNT                       | OTHER                          | 1    | 220013  | OL other | 0           |
|                 | HOST_ID=1000-0000-C921-3E98 | ADAPTER_ID=1000-0000-C921-3E98 |      |         |          |             |
| !NEWCON01       | WINNT                       | OTHER                          | 1    | 260013  | OL other | 0           |
|                 | HOST_ID=1000-0000-C920-A7B9 | ADAPTER_ID=1000-0000-C920-A7B9 |      |         |          |             |
| !NEWCON02       | WINNT                       | THIS                           | 1    | 250013  | OL this  | 0           |
|                 | HOST_ID=1000-0000-C921-3EFC | ADAPTER_ID=1000-0000-C921-3EFC |      |         |          |             |
| !NEWCON03       | WINNT                       | THIS                           | 1    | 200013  | OL this  | 0           |
|                 | HOST_ID=1000-0000-C921-3F4E | ADAPTER_ID=1000-0000-C921-3F4E |      |         |          |             |
| BUILDNGBA       | PPRC TARGET                 | OTHER                          | 2    |         | offline  | 0           |
|                 | HOST_ID=5000-1FE1-0000-4250 | ADAPTER_ID=5000-1FE1-0000-4254 |      |         |          |             |
| BUILDNGBB       | PPRC TARGET                 | THIS                           | 2    |         | offline  | 0           |
|                 | HOST_ID=5000-1FE1-0000-4250 | ADAPTER_ID=5000-1FE1-0000-4252 |      |         |          |             |
| BUILDNGBC       | PPRC INITIATOR              | OTHER                          | 2    |         | offline  | 0           |
|                 | HOST_ID=5000-1FE1-0000-4250 | ADAPTER_ID=5000-1FE1-0000-4254 |      |         |          |             |
| BUILDNGBD       | PPRC INITIATOR              | THIS                           | 2    |         | offline  | 0           |
|                 | HOST_ID=5000-1FE1-0000-4250 | ADAPTER_ID=5000-1FE1-0000-4252 |      |         |          |             |



3. Enable target controller access to all remote copy set units by issuing the following CLI command:

```
SET UnitName ENABLE = TargetRemoteCopyNameA, TargetRemoteCopyNameB,  
TargetRemoteCopyNameC, TargetRemoteCopyNameD
```

Example: set d1 enable = buildngBA, buildngBB, buildngBC, buildngBD



4. Verify the access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 22](#).

## Example Display 22

```

BuildngATop> show units full
      LUN                               Uses                Used by
-----
D1
LUN ID:      6000-1FE1-0000-01F0-0009-8490-6303-0134
IDENTIFIER = 1
Switches:
  RUN                NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
Size:      17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
LUN ID:      6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
Size:      17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```



5. Continue the New Hardware Failback at the target site with the Target Site Copy Data Procedure.

## Target Site Copy Data Procedure

The section describes how to copy the data from the target site to the initiator site.



1. Enable initiator controller access to all remote copy set units with this command:

```
SET UnitName ENABLE = InitiatorRemoteCopyNameA, InitiatorRemoteCopyNameB,
InitiatorRemoteCopyNameC, InitiatorRemoteCopyNameD
```

Example: set d1 enable = buildngAA, buildngAB, buildngAC, buildngAD



2. Verify the access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 23](#).

## Example Display 23

```

BuildngATop> show units full
      LUN                               Uses                Used by
-----
D1
LUN ID:      6000-1FE1-0000-01F0-0009-8490-6303-0134
IDENTIFIER = 1
Switches:
  RUN                NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:

```



```

BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD, HOSTB1, HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
Size:      17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
D2          DISK20000
LUN ID:     6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN              NOWRITE_PROTECT      READ_CACHE
  READAHEAD_CACHE  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD, HOSTB1, HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
Size:      17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```



3. Add back the target to the initiator unit's remote copy sets that were at the initiator site before failover with the following CLI command:

```
SET RemoteCopySetName ADD = InitiatorRemoteCopyName\UnitName
```

Example: set rcs1 add = buildngA\d1

You will see a confirmation message, as shown in [Example Display 24](#).

### Example Display 24

```

%EVL--BuildngBTop> --11-MAY-2001 12:53:20-- Instance Code: 0E050064
Template: 144.(90)
.
.
.
Instance Code: 0E050064

```



4. Verify that the initiator unit has been added back to the remote copy sets with the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 25](#).

### Example Display 25

```

BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGA\D1      is COPYING              1% complete
BuildngBTop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL

```

```

FAILOVER MODE    = MANUAL
OUTSTANDING IOS = 20
Initiator (BUILDNGB\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGA\D1      is NORMAL
    
```

When the units are all normalized, the Target state field of the display will show NORMAL.

---

**Note:** Wait for normalization on all remote copy sets to complete before proceeding.

---

- 5. If you plan to leave load running, you may now add write history logging to your association sets.

---

**Note:** For information on how to add write history logging to association sets, see Appendix C.

---

- 6. If you plan to leave load running, and your application requires failsafe mode, set failsafe mode with the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: set rcs1 error\_mode = failsafe

Repeat this step for all applicable remote copy sets.

---

**Note:** Failsafe cannot be set if the remote copy set is in an association set that will be used for write history logging.

---

- 7. When you are ready to resume the failback process, continue with the following steps.

---

**Note:** You must stop I/O from the target hosts to continue with the procedure from this point on.

---

- 8. Disable host access to all remote copy set units with the following CLI command:

```
SET UnitName DISABLE = TargetHostConnectionNamex,
TargetHostConnectionNamey
```

Example: set d1 disable = hostb1,hostb2

- 9. Verify the disabled host access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 26](#).

## Example Display 26

```

BuildngBTop> show units full
      LUN                               Uses                               Used by
-----
D1
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 32
    MAX_WRITE_CACHED_TRANSFER_SIZE = 32
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = THIS_CONTROLLER
  Size:          17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
  LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003F
  NOIDENTIFIER
  Switches:
    RUN              NOWRITE_PROTECT          READ_CACHE
    READAHEAD_CACHE  WRITEBACK_CACHE
    MAX_READ_CACHED_TRANSFER_SIZE = 128
    MAX_WRITE_CACHED_TRANSFER_SIZE = 128
  Access:
    BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
  State:
    ONLINE to this controller
    Not reserved
    PREFERRED_PATH = OTHER_CONTROLLER
  Size:          17769177 blocks
  Geometry (C/H/S): ( 5258 / 20 / 169 )

```



10. Continue the New Hardware Failback at the initiator site with the Initiator Site Return Control Procedure.

## Initiator Site Return Control Procedure

This section describes how to return Data Replication Manager control to the initiator site.



1. Disconnect controller access with the following CLI command:

```

SET THIS_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = OFFLINE

```



2. Verify the disconnection with the following CLI commands:

```

SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER

```

You will see a display similar to that in [Example Display 27](#).

## Example Display 27

```

BuildngATop> show this_controller
Controller:
  HSG80 ZG84906303 Software V87P, Hardware E03
  NODE_ID          = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS   = 0
  SCSI_VERSION      = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG84906237
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 11-MAY-2001 13:33:31
  Command Console LUN is lun 0 (IDENTIFIER = 99)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F3

```

```

        PORT_1_TOPOLOGY = FABRIC (fabric up)
        Address          = 220213
Host PORT_2:
        Reported PORT ID = 5000-1FE1-0000-01F4
        PORT_2_TOPOLOGY = OFFLINE (offline)
        REMOTE_COPY = BUILDNGA
.
.
.
BuildngBTop> show other_controller
Controller:
        HSG80 ZG84906237 Software V87P, Hardware E03
        NODE ID          = 5000-1FE1-0000-01F0
        ALLOCATION_CLASS = 0
        SCSI_VERSION     = SCSI-3
        Configured for MULTIBUS FAILOVER with ZG84906303
        In dual-redundant configuration
        Device Port SCSI address 6
        Time: 11-MAY-2001 12:08:17
        Command Console LUN is lun 0 (IDENTIFIER = 99)
Host PORT_1:
        Reported PORT ID = 5000-1FE1-0000-01F1
        PORT_1_TOPOLOGY = FABRIC (fabric up)
        Address          = 250213
Host PORT_2:
        Reported PORT ID = 5000-1FE1-0000-01F2
        PORT_2_TOPOLOGY = OFFLINE (offline)
        Address          = 250413
        REMOTE_COPY = BUILDNGA
.
.
.

```



3. Move the initiator role to the original initiator with the following CLI command:

```
SITE_FAILOVER TargetRemoteCopyName\RemoteCopySetName
```

Example: `site_failover buildngB\rscs1`

You will see a confirmation message, as shown in [Example Display 28](#).

### Example Display 28

```

%EVL--BuildngATop> --10-MAY-2001 17:57:17-- Instance Code: 0E010064
Template: 144.(90)
Occurred on 10-MAY-2001 at 17:57:17
Power On Time: 2. Years, 45. Days, 10. Hours, 44. Minutes, 43. Seconds
Controller Model: HSG80
Serial Number: ZG84906303 Hardware Version: E03(2B)
Software Version: V87P
Informational Report
Target Controller Board Serial Number: "          ....."
Initiator WWLID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Initiator Node Name: "BUILDNGA"
Initiator Unit Number: 1.(00000001)
Target WWLID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Target Node Name: "BUILDNGB"
Target Unit Number: 1.(00000001)
Number of Targets: 1.(00000001)
Remote Copy Set Name: "RCS1"
Association Set Name: ""
Log Unit Number: Not Available
Instance Code: 0E010064

```



4. Verify the initiator site setup with the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 29](#).

## Example Display 29

```
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is COPYING              1% complete
BuildngATop> show remote_copy_sets full
Name                               Uses                               Used by
-----
RCS1      remote copy              D1
Reported LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
Switches:
  OPERATION MODE = SYNCHRONOUS
  ERROR MODE     = NORMAL
  FAILOVER MODE  = MANUAL
  OUTSTANDING IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
```

**Note:** Verify that the initiator is identified as BUILDNGA and the target is identified as BUILDNGB.



5. Continue the New Hardware Failback at the target site with the Target Site Restore Procedure.

## Target Site Restore Procedure



1. Turn off write history logging, if enabled, with the following CLI command:

```
SET AssociationSetName NOLOG_UNIT
```

Example: `set as_d1 nolog_unit`

Repeat this step for each applicable association set.



2. Verify that write history logging has been turned off with the following CLI command:

```
SHOW ASSOCIATIONS FULL
```

You will see a display similar to that in [Example Display 30](#).

## Example Display 30

```
BuildngBTop> show associations full
Name      Association                Uses      Used by
-----
AS_D1     association                    RCS1
                                                RCS2

Switches:
  NOFAIL_ALL
  NOORDER_ALL
  NOLOG_UNIT
```

Repeat this procedure for each association set.

3. Delete the association set by using the following CLI command:  
`DELETE AssociationSetName`  
 Example: `delete as_d1`
4. Delete all remote copy sets with the following CLI command:  
`DELETE RemoteCopySetName`  
 Example: `delete rcs1`  
 Repeat this step for each remote copy set.
5. Set the maximum cached transfer size to 128 with the following CLI command:  
`SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128`  
 Example: `set d1 maximum_cached_transfer_size = 128`  
 Repeat this step for each remote copy set.
6. After completing the above action, verify the maximum cached transfer size with the following CLI command:  
`SHOW UNITS FULL`

You will see a display similar to that in [Example Display 31](#).

### Example Display 31

```
BuildngBTop> show units full
      LUN                               Uses                               Used by
-----
D1                                     DISK10000
LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
Size:          17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                     DISK20000
LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
Size:          17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

**Note:** This command sets both the read and write maximum cached transfer size.

- 7. Continue the New Hardware Failback at the initiator site with the Initiator Site Restoration of Target Connections Procedure.

## Initiator Site Restoration of Target Connections Procedure

This section describes how to restore all target connections from the initiator site.

- 1. To restore the connections to the target site, enter the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```

- 2. Verify the restoration with the following CLI command:

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 32](#).

### Example Display 32

```
BuildngATop> show this_controller
Controller:
HSG80 ZG84906303 Software V87P, Hardware E03
NODE_ID          = 5000-1FE1-0000-01F0
ALLOCATION_CLASS  = 0
SCSI_VERSION     = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG84906237
    In dual-redundant configuration
Device Port SCSI address 7
Time: 11-MAY-2001 13:43:37
Command Console LUN is lun 0 (IDENTIFIER = 99)
Host PORT_1:
    Reported PORT_ID = 5000-1FE1-0000-01F3
    PORT_1_TOPOLOGY = FABRIC (fabric up)
    Address          = 220213
Host PORT_2:
    Reported PORT_ID = 5000-1FE1-0000-01F4
    PORT_2_TOPOLOGY = FABRIC (fabric up)
    Address          = 220413
    REMOTE_COPY      = BUILDNGA
.
.
.
BuildngBTop> show other_controller
Controller:
HSG80 ZG84906237 Software V87P, Hardware E03
NODE_ID          = 5000-1FE1-0000-01F0
ALLOCATION_CLASS  = 0
SCSI_VERSION     = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG84906303
    In dual-redundant configuration
Device Port SCSI address 6
Time: 11-MAY-2001 12:08:17
Command Console LUN is lun 0 (IDENTIFIER = 99)
Host PORT_1:
    Reported PORT_ID = 5000-1FE1-0000-01F1
    PORT_1_TOPOLOGY = FABRIC (fabric up)
    Address          = 250213
Host PORT_2:
    Reported PORT_ID = 5000-1FE1-0000-01F2
    PORT_2_TOPOLOGY = FABRIC (fabric up)
    Address          = 250413
    REMOTE_COPY      = BUILDNGA
.
.
.
```

3. If you decide to, you can now change remote copy sets to asynchronous mode with the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = ASYNCHRONOUS
```

Example: `set rcs1 operation_mode = asynchronous`

Repeat this step for all applicable remote copy sets.

4. Create association sets and then add the log unit, if desired. For information on how to create association sets, with or without write history logging, see Appendix C.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---

5. Verify the creation with the following CLI command:

```
SHOW ASSOCIATIONS FULL
```

You will see a display similar to that in [Example Display 33](#).

### Example Display 33

```
BuildngATop> show associations full
Name          Association          Uses          Used by
-----
AS_D1         association          RCS1
                                   RCS2

Switches:
  NOFAIL_ALL
  NOORDER_ALL
  LOG_UNIT = D10 (No data logged)
```

6. Re-enable failsafe mode, if desired. To set failsafe mode, enter the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: `set rcs1 error_mode = failsafe`

---

**Note:** Failsafe cannot be set if the remote copy set is in an association set that will be used for write history logging.

---

7. If the initiator hosts were shut down, reboot them now. Rename all !NEWCONxx connections to their previous names with the following CLI command:

```
RENAME !NEWCONxx InitiatorHostConnectionName
```

Example: `rename !newconxx hostA1`

8. Verify the connections with the following CLI command:

```
SHOW CONNECTIONS
```

You will see a display similar to that in [Example Display 34](#).



## Example Display 34

```

BuildngATop> show connections
Connection
Name      Operating system  Controller  Port  Address  Status  Unit
Offset
BUILDNGBA  PPRC_TARGET      THIS       2     260413  OL this  0
HOST_ID=5000-1FE1-0000-4250 ADAPTER_ID=5000-1FE1-0000-4254
BUILDNGBB  PPRC_TARGET      OTHER      2     200413  OL other  0
HOST_ID=5000-1FE1-0000-4250 ADAPTER_ID=5000-1FE1-0000-4252
BUILDNGBC  PPRC_INITIATOR   THIS       2     offline  0
HOST_ID=5000-1FE1-0000-4250 ADAPTER_ID=5000-1FE1-0000-4254
BUILDNGBD  PPRC_INITIATOR   OTHER      2     offline  0
HOST_ID=5000-1FE1-0000-4250 ADAPTER_ID=5000-1FE1-0000-4252
HOSTA1     WINNT            THIS       1     260013  OL this  0
HOST_ID=1000-0000-C920-A7B9 ADAPTER_ID=1000-0000-C920-A7B9
HOSTA2     WINNT            OTHER      1     200013  OL other  0
HOST_ID=1000-0000-C921-3F4E ADAPTER_ID=1000-0000-C921-3F4E
HOSTB1     WINNT            THIS       1     220013  OL this  0
HOST_ID=1000-0000-C921-3E98 ADAPTER_ID=1000-0000-C921-3E98
HOSTB2     WINNT            OTHER      1     250013  OL other  0
HOST_ID=1000-0000-C921-3EFC ADAPTER_ID=1000-0000-C921-3EFC

```



- Set all connections that were renamed back to their appropriate operating system with the following CLI command.

```
SET InitiatorHostConnectionName OPERATING_SYSTEM = (HP, IBM, NETWARE, SUN,
Tru64_UNIX, VMS, or WINNT)
```

Example: set hostA1 operating\_system = vms



- Verify the connections with the following CLI command:

```
SHOW CONNECTIONS
```

You will see a display similar to that in [Example Display 35](#).

## Example Display 35

```

BuildngATop> show connections
Connection
Name      Operating system  Controller  Port  Address  Status  Unit
Offset
BUILDNGBA  PPRC_TARGET      THIS       2     260413  OL this  0
HOST_ID=5000-1FE1-0000-4250 ADAPTER_ID=5000-1FE1-0000-4254
BUILDNGBB  PPRC_TARGET      OTHER      2     200413  OL other  0
HOST_ID=5000-1FE1-0000-4250 ADAPTER_ID=5000-1FE1-0000-4252
BUILDNGBC  PPRC_INITIATOR   THIS       2     offline  0
HOST_ID=5000-1FE1-0000-4250 ADAPTER_ID=5000-1FE1-0000-4254
BUILDNGBD  PPRC_INITIATOR   OTHER      2     offline  0
HOST_ID=5000-1FE1-0000-4250 ADAPTER_ID=5000-1FE1-0000-4252
HOSTA1     VMS              THIS       1     260013  OL this  0
HOST_ID=1000-0000-C920-A7B9 ADAPTER_ID=1000-0000-C920-A7B9
HOSTA2     VMS              OTHER      1     200013  OL other  0
HOST_ID=1000-0000-C921-3F4E ADAPTER_ID=1000-0000-C921-3F4E
HOSTB1     VMS              THIS       1     220013  OL this  0
HOST_ID=1000-0000-C921-3E98 ADAPTER_ID=1000-0000-C921-3E98
HOSTB2     VMS              OTHER      1     250013  OL other  0
HOST_ID=1000-0000-C921-3EFC ADAPTER_ID=1000-0000-C921-3EFC

```



11. You can enhance host I/O performance by resetting the maximum cached transfer size to the value used on the original initiator. Obtain your record of `SHOW` command output that details the original initiator configuration. Using the output as a reference, set the maximum cached transfer size to the original initiator value using the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: `set d1 maximum_cache_transfer_size = 32`

Repeat this step for all remote copy set units.

---

**Note:** The default maximum cache transfer size is 32.

---



12. Enable host access to the units by using the following CLI command:

```
SET UnitName ENABLE = InitiatorHostConnectionNamex,  
InitiatorHostConnectionNamey
```

Example: `set d1 enable = hosta1, hosta2`



13. Verify host access with the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 36](#).

Repeat this step for all units.

### Example Display 36

```
BuildngATop> show units full
```

| LUN                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Uses      | Used by       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------|
| D1                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | DISK10000 | BUILDNGA\RCS1 |
| LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134<br>IDENTIFIER = 1<br>Switches:<br>RUN NOWRITE_PROTECT READ_CACHE<br>READAHEAD_CACHE WRITEBACK_CACHE<br>MAX_READ_CACHED_TRANSFER_SIZE = 32<br>MAX_WRITE_CACHED_TRANSFER_SIZE = 32<br>Access:<br>BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD, <b>HOSTA1, HOSTA2</b><br>State:<br>ONLINE to this controller<br>Not reserved<br>PREFERRED_PATH = THIS_CONTROLLER<br>Size: 17769177 blocks<br>Geometry (C/H/S): ( 5258 / 20 / 169 ) |           |               |
| D2                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | DISK20000 |               |
| LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135<br>NOIDENTIFIER<br>Switches:<br>RUN NOWRITE_PROTECT READ_CACHE<br>READAHEAD_CACHE WRITEBACK_CACHE<br>MAX_READ_CACHED_TRANSFER_SIZE = 32<br>MAX_WRITE_CACHED_TRANSFER_SIZE = 32<br>Access:<br>BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD, <b>HOSTA1, HOSTA2</b><br>State:<br>ONLINE to this controller<br>Not reserved<br>PREFERRED_PATH = OTHER_CONTROLLER<br>Size: 17769177 blocks<br>Geometry (C/H/S): ( 5258 / 20 / 169 )  |           |               |



14. Allow hosts to recognize new units. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.  
 If the initiator site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:  

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```
  - b. **HP Tru64 UNIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.  
 If the initiator site hosts are not shut down, use the following command to recognize the drives:  

```
hwmgr - scan scsi
```

 This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:  

```
hwmgr -scan scsi -bus x
```

 where x is the SCSI bus number.
  - c. **HP-UX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.  
 If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:  

```
ioscan -fnCdisk
```

```
mount -a
```
  - d. **IBM AIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.  
 If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:  

```
cfgmgr -v
```

```
mount all
```
  - e. **Microsoft Windows NT-X86:** Reboot the hosts at the initiator site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.
  - f. **Microsoft Windows 2000:**
    - 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.
      - a) On each host, log in using an account that has administrative privileges.
      - b) Open **Computer Management** and click **Disk Management**.
      - c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.

2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.

- g. **Novell NetWare:** If the initiator site hosts are shut down, boot them now. Booting the hosts allows Novell NetWare to recognize the drives.

If the initiator site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.

- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u  
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]  
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes the Unplanned Site Failover with Failback to New Hardware.

# Planned Site Role Reversal Procedure

## 10

In this situation you will be performing a planned move of initiator operations from the initiator site to an alternate (target) site. You will prepare the initiator site for the failover, then perform a failover to the alternate site. The original initiator site remains intact, operational, and online during the role reversal. You will then perform a role reversal failback to the original initiator site, when desired.

This chapter contains the following procedures to ensure that failover and subsequent failback during a role reversal scenario function properly:

- [Role Reversal Failover](#), page 158
- [Role Reversal Failback](#), page 170

---

**Note:** In this chapter, *initiator* site procedure steps are identified by an arrow symbol ► in the margin. *Target* site procedure steps are identified by a target symbol Ⓢ in the margin.

Some example displays illustrate confirmation messages with the event log symbol (%EVL) and an instance code. Compare the instance code in the example with the instance code you receive. If the numbers are the same, you have performed the previous command correctly and have achieved the desired results. Note that you will be able to see these screens only if you are working from the controller to which the LUNs are online. Refer to the “Troubleshooting” chapter for more information on instance codes and their meanings.

Example displays may also contain bold text to identify information that is the most pertinent in the example. In many cases, items shown in bold text will help you verify the results of a previous command.

---

## Role Reversal Failover

To carry out a Role Reversal Failover, follow the procedure outlined in the following sections, in conjunction with the Role Reversal Failback. The Role Reversal Failover consists of the following procedures:

- Initiator Site Preparation Procedure
- Target Site Failover Procedure
- Target Host Setup Procedure

### Initiator Site Preparation Procedure

- ▶ 1. Before performing the failover procedure, locate your record of SHOW command output that details the current initiator configuration.  
Verify that your target controller configuration is the same as your initiator controller configuration. Compare the status of the controllers, association sets, remote copy sets, units, and connections. Appendix A contains the full procedure.
- ▶ 2. Verify that all remote copy sets are in the normal state by issuing the following command:  
`SHOW REMOTE_COPY_SETS FULL`  
You will see a display similar to that in [Example Display 1](#).

#### Example Display 1

```
BuildngATop> SHOW REMOTE_COPY_SETS FULL
Name                               Uses                               Used by
-----
RCS1      remote copy              D1                               AS_D1
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D1) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D1      is NORMAL
RCS2      remote copy              D2
Reported LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135
Switches:
  OPERATION_MODE = SYNCHRONOUS
  ERROR_MODE     = NORMAL
  FAILOVER_MODE  = MANUAL
  OUTSTANDING_IOS = 20
Initiator (BUILDNGA\D2) state:
  ONLINE to this controller
  Not reserved
Target state:
  BUILDNGB\D2      is NORMAL
```

- ▶ 3. Follow the steps listed below for each operating system in your heterogeneous configuration:
  - a. **HP OpenVMS:** If the operating system is up and running, and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.

- b. **HP Tru64 UNIX:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all file system LUNs that have remote copy sets that will be failed over.
- c. **HP-UX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
- d. **IBM AIX:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then unmount the file systems associated with these LUNs.
- e. **Microsoft Windows NT-X86:** If the operating system is up and running, shut it down and power off the hosts.
- f. **Microsoft Windows 2000:** If the operating system is up and running, shut it down and power off the hosts.
- g. **Novell NetWare:** If the operating system is up and running, remove all I/O to the remote copy set LUNs that will be failed over, then dismount the volumes associated with these LUNs.



**Caution:** If you are using NWCS, failure to enter the following two commands will cause all cluster nodes to abend.

---

If you are using NWCS, you must enter the `cluster down` command. You must also enter the `uldnscs` (unload NetWare Cluster Services) command for all cluster nodes.

- h. **Sun Solaris:** If the operating system is up and running and is being used exclusively for DRM operations, shut down the operating system and power off the hosts. If the operating system is being used for other applications, remove all I/O and unmount all volumes that have remote copy sets that will be failed over.



4. If your remote copy sets are set for asynchronous operation mode, switch to synchronous mode using the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = SYNCHRONOUS
```

Example: `set rcs1 operation_mode = synchronous`

Repeat this step for all applicable remote copy sets.



5. Turn off write history logging, if enabled, with the following CLI command:

```
SET AssociationSetName NOLOG_UNIT
```

Example: `set as_d1 nolog_unit`

Repeat this procedure for each association set.



6. Delete any association sets with the following CLI command:

```
DELETE AssociationSetName
```

Example: `delete as_d1`

Repeat this procedure for each association set.



7. Disable host access to the remote copy set units with the following CLI command:

**Note:** Do not disable access to the target connection.

```
SET UnitName DISABLE = InitiatorHostConnectionNamex,
InitiatorHostConnectionNamey
```

Example: set d1 disable = hosta1,hosta2

Repeat this step for all remote copy set units.



8. Each remote copy set unit should have four connections enabled to TargetRemoteCopyNameA, TargetRemoteCopyNameB, TargetRemoteCopyNameC, and TargetRemoteCopyNameD.

- a. Verify the access path for each unit used by remote copy sets by entering the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 2](#).

### Example Display 2

```
BuildngATop> SHOW UNITS FULL
LUN                                     Uses                               Used by
-----
D1                                     DISK10000                          BUILDNGA\RCS1
LUN ID:                               6000-1FE1-0000-01F0-0009-8490-6303-0134
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
Size:                                17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                     DISK20000                          BUILDNGA\RCS2
LUN ID:                               6000-1FE1-0000-01F0-0009-8490-6303-0135
NOIDENTIFIER
Switches:
  RUN                                NOWRITE_PROTECT                      READ_CACHE
  READAHEAD_CACHE                    WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
Size:                                17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

- b. If target controller access to the units used by remote copy sets is not currently enabled, enable access by issuing the following command for each unit:

```
SET UnitName ENABLE = TargetRemoteCopyNameA,
TargetRemoteCopyNameB, TargetRemoteCopyNameC, TargetRemoteCopyNameD
```

Example: set d1 enable = buildngbA,buildngbB,buildngbC, buildngbD



9. Set maximum cached transfer size for all remote copy set units to 128 with the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: set d1 maximum\_cached\_transfer\_size = 128



Repeat this step for all remote copy set units.

---

**Note:** This command sets both the read and write maximum cached transfer size.

---



10. Continue the Role Reversal Failover process at the target site with the Target Site Failover Procedure.

## Target Site Failover Procedure



1. At the target site, the units must be preferred to one controller or the other.
  - a. Use the following CLI command to check for the preferred path:

SHOW UNITS FULL

You will see a display similar to that in [Example Display 3](#).

### Example Display 3

```
BuildngBTop> SHOW UNITS FULL
LUN
-----
D1
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN NOWRITE_PROTECT READ_CACHE
  READAHEAD_CACHE WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
  Target NORMAL
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
D2
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN NOWRITE_PROTECT READ_CACHE
  READAHEAD_CACHE WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
  Target NORMAL
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

- b. If units are not currently preferred, use the following CLI command:

SET UnitName PREFERRED\_PATH = THIS\_CONTROLLER

Example: set d1 preferred\_path = this\_controller

or

SET UnitName PREFERRED\_PATH = OTHER\_CONTROLLER

Example: set d2 preferred\_path = other\_controller

Repeat this step for each remote copy set unit that needs to be preferred.

2. Disconnect controller access with the following CLI commands:
 

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = OFFLINE
```
3. Verify the disconnect by performing the following CLI commands:
 

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 4](#).

#### Example Display 4

```
BuildngBTop> show this_controller
Controller:
  HSG80 ZG84906303 Software V87P, Hardware E03
  NODE_ID           = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS    = 0
  SCSI_VERSION       = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG84906237
    In dual-redundant configuration
  Device Port SCSI address 7
  Time: 10-MAY-2001 17:55:29
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F3
  PORT_1_TOPOLOGY  = FABRIC (fabric up)
  Address          = 220213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F4
  PORT_2_TOPOLOGY  = OFFLINE (offline)
  REMOTE_COPY      = BUILDNGA
.
.
.
BuildngBTop> show other_controller
Controller:
  HSG80 ZG84906237 Software V87P, Hardware E03
  NODE_ID           = 5000-1FE1-0000-01F0
  ALLOCATION_CLASS    = 0
  SCSI_VERSION       = SCSI-3
  Configured for MULTIBUS_FAILOVER with ZG84906303
    In dual-redundant configuration
  Device Port SCSI address 6
  Time: 10-MAY-2001 17:55:39
  Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-0000-01F1
  PORT_1_TOPOLOGY  = FABRIC (fabric up)
  Address          = 250213
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-0000-01F2
  PORT_2_TOPOLOGY  = OFFLINE (offline)
  REMOTE_COPY      = BUILDNGA
.
.
.
```

4. Move the initiator role to the target site with the following CLI command:
 

```
SITE_FAILOVER InitiatorRemoteCopyName\RemoteCopySetName
```

Example: `site_failover buildnga\rsc1`

You will see a confirmation message, as shown in [Example Display 5](#).

## Example Display 5

```
BuildngBTop> site_failover Buildnga\rcl1
%EVL--BuildngBTop> --10-MAY-2001 15:47:39-- Instance Code: 0E010064
Template: 144.(90)
.
.
.
Instance Code: 0E010064
```

Repeat this step for each remote copy set.



5. Restore the connections to the target site with the following CLI commands:

```
SET THIS_CONTROLLER PORT_2_TOPOLOGY = FABRIC
SET OTHER_CONTROLLER PORT_2_TOPOLOGY = FABRIC
```



6. After completing this action, verify the restoration with the following CLI commands.

```
SHOW THIS_CONTROLLER
SHOW OTHER_CONTROLLER
```

You will see a display similar to that in [Example Display 6](#).

## Example Display 6

```
BuildngBTop> show this_controller
Controller:
HSG80 ZG94115654 Software V87P, Hardware E10
NODE_ID = 5000-1FE1-0000-4250
ALLOCATION_CLASS = 0
SCSI_VERSION = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG94319198
In dual-redundant configuration
Device Port SCSI address 7
Time: 10-MAY-2001 17:34:11
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-4253
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address = 260213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-4254
PORT_2_TOPOLOGY = FABRIC (fabric up)
Address = 260413
REMOTE_COPY = BUILDNGB
.
.
.
BuildngBTop> show other_controller
Controller:
HSG80 ZG94319198 Software V87P, Hardware E10
NODE_ID = 5000-1FE1-0000-4250
ALLOCATION_CLASS = 0
SCSI_VERSION = SCSI-3
Configured for MULTIBUS_FAILOVER with ZG94115654
In dual-redundant configuration
Device Port SCSI address 6
Time: 10-MAY-2001 17:34:20
Command Console LUN is lun 0 (NOIDENTIFIER)
Host PORT_1:
Reported PORT_ID = 5000-1FE1-0000-4251
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address = 200213
Host PORT_2:
Reported PORT_ID = 5000-1FE1-0000-4252
PORT_2_TOPOLOGY = FABRIC (fabric up)
Address = 200413
REMOTE_COPY = BUILDNGB
.
.
.
```

- 7. If you changed an asynchronous remote copy set to synchronous during failover, change it back to asynchronous mode by issuing the following CLI command:

```
SET RemoteCopySetName OPERATION_MODE = ASYNCHRONOUS
```

Example: `set rcs1 operation_mode = asynchronous`

Repeat this step for all applicable remote copy sets.

- 8. If desired, create association sets and set up write history logging to duplicate the association sets that are on the initiator.

Repeat this step for each applicable association set.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

The procedure to create association sets is contained in Appendix C.

---

- 9. When you have created the association sets, verify the creation with the following CLI command:

```
SHOW ASSOCIATIONS FULL
```

You will see a display similar to [Example Display 7](#).

### Example Display 7

```
BuildngBTop> show associations full
Name          Association          Uses          Used by
-----
AS_D1         association          RCS1
Switches:
  NOFAIL_ALL
  NOORDER_ALL
  LOG_UNIT = D10 (99% available)
```

- 10. Re-enable failsafe mode, if desired. To set failsafe mode, enter the following CLI command:

```
SET RemoteCopySetName ERROR_MODE = FAILSAFE
```

Example: `set rcs1 error_mode = failsafe`

Repeat this step for all applicable remote copy sets.

---

**Note:** Failsafe cannot be set if the remote copy set is in an association set that will be used for write history logging.

---

- 11. Continue the failover procedure at the target site with the Target Host Setup Procedure.

## Target Host Setup Procedure

1. If you wish, you can enhance host I/O performance by resetting the maximum cached transfer size to the value used on the initiator. Use this command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: set d1 maximum\_cached\_transfer\_size = 32

Repeat this step for each unit.

---

**Note:** The default maximum cached transfer size is 32.

---

2. Give the target site hosts access to the units that are used by remote copy sets in the storage subsystems with this command:

```
SET UnitName ENABLE = TargetHostConnectionNamex,  
TargetHostConnectionNamey
```

Example: set d1 enable = hostb1,hostb2

You will see a display similar to that in [Example Display 8](#).

### Example Display 8

```
BuildngBTop> set d1 enable=hostb1,hostb2  
Warning 1000: Other host(s) in addition to the one(s) specified can still  
              access this unit. If you wish to enable ONLY the host(s)  
              specified, disable all access paths (DISABLE_ACCESS=ALL), then  
              again enable the ones specified
```

3. If you do not recall a target host connection name, use the following CLI command:

```
SHOW CONNECTION
```

You will see a display similar to that in [Example Display 9](#).

### Example Display 9

```
BuildngBTop> show connection
```

| Connection Name | Operating system            | Controller | Port | Address                        | Status   | Unit Offset |
|-----------------|-----------------------------|------------|------|--------------------------------|----------|-------------|
| BUILDNGAA       | PPRC_TARGET                 | THIS       | 2    |                                | offline  | 0           |
|                 | HOST_ID=5000-1FE1-0000-01F0 |            |      | ADAPTER_ID=5000-1FE1-0000-01F4 |          |             |
| BUILDNGAB       | PPRC_TARGET                 | OTHER      | 2    |                                | offline  | 0           |
|                 | HOST_ID=5000-1FE1-0000-01F0 |            |      | ADAPTER_ID=5000-1FE1-0000-01F2 |          |             |
| BUILDNGAC       | PPRC_INITIATOR              | THIS       | 2    | 220413                         | OL this  | 0           |
|                 | HOST_ID=5000-1FE1-0000-01F0 |            |      | ADAPTER_ID=5000-1FE1-0000-01F4 |          |             |
| BUILDNGAD       | PPRC_INITIATOR              | OTHER      | 2    | 250413                         | OL other | 0           |
|                 | HOST_ID=5000-1FE1-0000-01F0 |            |      | ADAPTER_ID=5000-1FE1-0000-01F2 |          |             |
| HOSTA1          | WINNT                       | THIS       | 1    | 260013                         | OL this  | 0           |
|                 | HOST_ID=1000-0000-C920-A7B9 |            |      | ADAPTER_ID=1000-0000-C920-A7B9 |          |             |
| HOSTA2          | WINNT                       | OTHER      | 1    | 200013                         | OL other | 0           |
|                 | HOST_ID=1000-0000-C921-3F4E |            |      | ADAPTER_ID=1000-0000-C921-3F4E |          |             |
| HOSTB1          | WINNT                       | THIS       | 1    | 220013                         | OL this  | 0           |
|                 | HOST_ID=1000-0000-C921-3E98 |            |      | ADAPTER_ID=1000-0000-C921-3E98 |          |             |
| HOSTB2          | WINNT                       | OTHER      | 1    | 250013                         | OL other | 0           |
|                 | HOST_ID=1000-0000-C921-3EFC |            |      | ADAPTER_ID=1000-0000-C921-3EFC |          |             |



- After you have given the target site hosts access, perform the following CLI command to verify the access:

```
SHOW UnitName
```

You will see a display similar to that in [Example Display 10](#).

### Example Display 10

```
BuildngBTop> show d1
LUN
-----
D1
LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN              NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
Size:              17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```



- Verify that the target hosts can connect to the LUNs with this command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 11](#).

### Example Display 11

```
BuildngBTop> show units full
LUN
-----
D1
LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN              NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS_CONTROLLER
Size:              17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2
LUN ID:          6000-1FE1-0000-4250-0009-9411-5654-003F
NOIDENTIFIER
Switches:
  RUN              NOWRITE_PROTECT          READ_CACHE
  READAHEAD_CACHE  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD,  HOSTB1,  HOSTB2
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = OTHER_CONTROLLER
  Target NORMAL
Size:              17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

In the Access field of the display, all units that are used by remote copy sets will show that the target host connections are enabled. The display should also show the initiator controller connections.



6. Allow hosts to recognize new units. Follow the steps listed below for each operating system in your heterogeneous configuration:

- a. **HP OpenVMS:** If the target site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.

If the target site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```

- b. **HP Tru64 UNIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the target site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where x is the SCSI bus number.

- c. **HP-UX:**

- 1) If the target site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the target site hosts are not shut down, use the following command to enable HP-UX to recognize the drives and verify that they are present. This command will display only the previously configured failed-over LUNs:

```
ioscan -fnCdisk
```

- 2) Continue with the following commands to access file systems on new failed-over LUNs. If you have no new failed-over LUNs, skip these substeps and go directly to the next step to mount the LUNs:

- a) `/opt/CPQswsp/spmgr display -u`

- b) `/opt/CPQswsp/spmgr add WWN`

Repeat this command for each un-attached WWN that was displayed.

- c) `ioscan -fnCdisk`

If the device special files were not displayed, run `insf -e`, then run `ioscan -fnCdisk` again.

- d) `/vgimport VolumeGroupName DeviceSpecialFile`

Repeat this command for each new failed-over LUN.

- 3) Use the following command to mount the LUNs:

```
mount -a
```

---

**Note:** *VolumeGroupName* is the name of the volume group you originally created at the initiator site. The *DeviceSpecialFiles* are from the *ioscan* in the form of */dev/dsk/c\_t\_d\_*. For consistency, configure the same *DeviceSpecialFiles* with the same volume groups, logical volumes, and file systems for the failed-over LUNs at the target site with the same LUNs at the initiator site.

---

- d. **IBM AIX:** If the target site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the target site hosts are not shut down, use the following commands to enable AIX to recognize the drives and verify that they are present:

```
cfgmgr -v  
lsdev -C disk
```

Use the following commands to access file systems on the failed-over LUNs:

```
importvg -y volumegroupname hdiskx  
mount all
```

---

**Note:** *volumegroupname* is the name of the volume group you originally created at the initiator site, and *x* is the number of the hdisk assigned to the failed-over LUN. If the *-y volumegroupname* parameter is omitted, AIX will create a default volume group name for you, for example, *vg00*.

---

- e. **Microsoft Windows NT-X86:** Reboot the hosts at the target site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.
- f. **Microsoft Windows 2000:**
- 1) If you *have not* changed the **UNIT\_OFFSET** of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.
    - a) On each host, log in using an account that has administrative privileges.
    - b) Open **Computer Management** and click **Disk Management**.
    - c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.
  - 2) If you *have* changed the **UNIT\_OFFSET** of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.
- g. **Novell NetWare:** If the target site hosts are shut down, boot them now. If you are using traditional NetWare volumes, booting the hosts allows Novell NetWare to recognize the drives and automatically mount the volumes. If you are using NSS logical volumes, booting the hosts will recognize the NSS pools and activate them. However, you must manually mount each individual NSS volume by typing **MOUNT VolumeName** at the NetWare console.



If the target site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.

Next, mount the volumes with these commands:

```
MOUNT ALL (for traditional NetWare volumes)
```

```
MOUNT VolumeName (for NSS logical volumes).
```

- h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v
```

```
disks
```

```
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u
```

```
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]
```

```
drvconfig -v
```

```
disks
```

```
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes the Role Reversal Failover. The next section describes the Role Reversal Failback from a Role Reversal Failover.

## Role Reversal Failback

The Role Reversal Failback is used in conjunction with the Role Reversal Failover Procedure. The Role Reversal Failback consists of the following procedures:

- Target Site Failback Procedure
- Initiator Site Cleanup Procedure

### Target Site Failback Procedure

- ① 1. Shut down the target site hosts (this is not necessary for HP OpenVMS, HP Tru64 UNIX, HP-UX, IBM AIX, Sun Solaris, and Novell Netware operating systems).

---

**Note:** If hosts are not shut down, you must remove host access on all LUNs used with remote copy sets.

---

- ② 2. Disable host access to the target units for all remote copy sets with the following CLI command:

```
SET UnitName DISABLE = TargetHostConnectionNamex,  
TargetHostConnectionNamey
```

Example: set d1 disable = hostb1,hostb2

Repeat this step for all units.

- ③ 3. You may now boot hosts for non-remote copy set units.
- ④ 4. Turn off write history logging, if enabled, with the following CLI command:

```
SET AssociationSetName NOLOG_UNIT
```

Example: set as\_d1 nolog\_unit

Repeat this procedure for each association set.

- ⑤ 5. Delete association sets with the following CLI command:

```
DELETE AssociationSetName
```

Example: delete as\_d1

Repeat this procedure for each association set.

- ⑥ 6. Move control of the remote copy sets to the original initiator with the following CLI command:

```
SET RemoteCopySetName INITIATOR = InitiatorRemoteCopyName\UnitName
```

Example: set rcs1 initiator = buildnga\d1

---

**Note:** After you issue this command for one of the remote copy sets, you may get the error message: Error: Rem Cp Set specified is currently in a transient state. If you do, wait a few seconds and try again. The command will eventually succeed.

---

- ⑦ 7. Verify original initiator control with the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 12](#).

### Example Display 12

```
BuildngBTop> show remote_copy_sets full
No REMOTE_COPY_SETS
```

Repeat this step for all remote copy sets.

8. If maximum cached transfer size was changed for the target units as part of the failover procedure, set it back to 128 with the following CLI command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = 128
```

Example: set d1 maximum\_cached\_transfer\_size = 128

9. Verify the change with the following CLI command:

```
SHOW UnitName
```

You will see a display similar to that in [Example Display 13](#).

### Example Display 13

```
BuildngBTop> show d1
LUN
-----
D1
LUN ID: 6000-1FE1-0000-4250-0009-9411-5654-003E
NOIDENTIFIER
Switches:
  RUN NOWRITE_PROTECT READ_CACHE
  READAHEAD_CACHE WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 128
  MAX_WRITE_CACHED_TRANSFER_SIZE = 128
Access:
  BUILDNGAA, BUILDNGAB, BUILDNGAC, BUILDNGAD
State:
  ONLINE to the other controller
  PREFERRED_PATH = THIS_CONTROLLER
  Target NORMAL
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )
```

---

**Note:** This command sets both the read and write maximum cached transfer size.

---

Repeat this procedure for each unit.

10. Continue with the Role Reversal Failback procedure at the initiator site with Initiator Site Cleanup Procedure.

## Initiator Site Cleanup Procedure

1. If you wish, you can enhance host I/O performance by resetting the maximum cached transfer size to the original value used on the initiator. Use this command:

```
SET UnitName MAXIMUM_CACHED_TRANSFER_SIZE = InitiatorValue
```

Example: set d1 maximum\_cached\_transfer\_size = 32

2. Verify the change of maximum cached transfer size to the original value by issuing the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that in [Example Display 14](#).

### Example Display 14

```

BuildingATop> show units full
-----
LUN                               Uses                               Used by
-----
D1                                DISK10000                          BUILDNGA\RCS1
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0134
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to the other controller
  PREFERRED_PATH = THIS CONTROLLER
  Host based logging NOT specified
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D2                                DISK20000                          BUILDNGA\RCS2
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0135
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                  WRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  BUILDNGBA, BUILDNGBB, BUILDNGBC, BUILDNGBD
State:
  ONLINE to the other controller
  PREFERRED_PATH = OTHER CONTROLLER
  Host based logging NOT specified
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

D10                               MIR_DLOG
LUN ID: 6000-1FE1-0000-01F0-0009-8490-6303-0181
NOIDENTIFIER
Switches:
  RUN                               NOWRITE_PROTECT                     READ_CACHE
  READAHEAD_CACHE                  NOWRITEBACK_CACHE
  MAX_READ_CACHED_TRANSFER_SIZE = 32
  MAX_WRITE_CACHED_TRANSFER_SIZE = 32
Access:
  None
State:
  ONLINE to this controller
  Not reserved
  PREFERRED_PATH = THIS CONTROLLER
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```



3. Create association sets and then add the log unit, if desired. For information on how to create association sets, with or without write history logging, see Appendix C.

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---



4. When you have created the association set, verify the creation with the following CLI command:

```
SHOW ASSOCIATION_SETS FULL
```

You will see a display similar to that in [Example Display 15](#).

## Example Display 15

```
BuildngATop> show association full
Name          Association          Uses          Used by
-----
AS_D1         association          RCS1
Switches:
NOFAIL_ALL
NOORDER_ALL
LOG_UNIT = D10 (No data logged)
```



5. Enable access to the initiator site host by using the following CLI command:

```
SET UnitName ENABLE = InitiatorHostConnectionNamex,
InitiatorHostConnectionNamey
```

Example: set d1 enable = hosta1,hosta2



6. Allow hosts to recognize new units. Follow the steps listed below for each operating system in your heterogeneous configuration:

- a. **HP OpenVMS:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables OpenVMS to recognize the drives.

If the initiator site hosts are not shut down, use the following command from a privileged account to enable OpenVMS to recognize the drives:

```
MCR SYSMAN IO AUTOCONFIGURE/LOG
```

- b. **HP Tru64 UNIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables Tru64 UNIX to recognize the drives.

If the initiator site hosts are not shut down, use the following command to recognize the drives:

```
hwmgr - scan scsi
```

This might take a while for large configurations. If this is the case, scan only those SCSI buses that have new units added. Scan only one bus at a time. Use the following command:

```
hwmgr -scan scsi -bus x
```

where *x* is the SCSI bus number.

- c. **HP-UX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables HP-UX to recognize the drives.

If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:

```
ioscan -fnCdisk
```

```
mount -a
```

- d. **IBM AIX:** If the initiator site hosts are shut down, boot them now. Booting the hosts enables IBM AIX to recognize the drives.

If the initiator site hosts are not shut down, use the following commands to recognize the drives and mount the file systems:

```
cfgmgr -v
```

```
mount all
```

- e. **Microsoft Windows NT-X86:** Reboot the hosts at the initiator site and log in using an account that has administrative privileges. You should be able to see all of the units by choosing **My Computer**.

f. **Microsoft Windows 2000:**

- 1) If you *have not* changed the UNIT\_OFFSET of any host connections since the hosts have been booted, you do not need to reboot the initiator site hosts.
  - a) On each host, log in using an account that has administrative privileges.
  - b) Open **Computer Management** and click **Disk Management**.
  - c) After **Disk Management** has initialized, go to the **Action** menu and click **Rescan Disks**. All of the failed over units should appear in the right-hand pane. If Secure Path is not installed correctly, you will see each unit twice.
- 2) If you *have* changed the UNIT\_OFFSET of any host connections, you must reboot that host. After the server has rebooted, log in using an account that has administrative privileges. You will see all of the units in **Computer Management > Disk Management**. If Secure Path is not installed correctly, you will see each drive twice.

g. **Novell NetWare:** If the initiator site hosts are shut down, boot them now. Booting the hosts allows Novell NetWare to recognize the drives.

If the initiator site hosts are already up and running, or if they do not recognize the drives, issue the following command from the console before mounting the volumes:

```
SCAN FOR NEW DEVICES
```

Alternatively, you can use the *NWCONFIG* utility to issue this same command.

h. **Sun Solaris:** Reboot the hosts using the `reboot -- -r` command, or use the following commands to update the Secure Path Manager:

```
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should be able to see all of the units with two paths in the Secure Path Manager. You should also be able to see all of the units by using the `format` command.

If Secure Path was not configured for these units, use the following commands to add them to the Secure Path Manager:

```
/opt/CPQswsp/bin/spmgr display -u  
/opt/CPQswsp/bin/spmgr add <WWID> [target] [lun]  
drvconfig -v  
disks  
/opt/CPQswsp/bin/spmgr display
```

You should now be able to see the drives using the `format` command. Refer to the current version of the *HP StorageWorks Secure Path for Sun Solaris Installation and Reference Guide* for additional assistance.

This completes the Role Reversal Failback Procedure.

# Troubleshooting

## 11

This chapter describes possible failure modes of a Data Replication Manager solution. Isolation of errors and detailed error analysis require a complete understanding of how a Data Replication Manager subsystem operates. While it is not possible to document every error and failure condition, key failures of the Data Replication Manager subsystem and its components during failover and failback are discussed.

Troubleshooting information on the HSG80 controller can be found in the *HP StorageWorks HSG80 Array Controller Version 8.7 Troubleshooting Reference Guide*. Troubleshooting information specific to the DRM configuration process can be found in the *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Configuration User Guide*.

Troubleshooting information on specific Data Replication Manager components can also be found in their respective user manuals.

This chapter contains the following topics:

- [HSG80 Array Controller Operating Characteristics](#), page 176
  - [Forced Errors Detected During Copy](#), page 176
  - [Read Errors Detected During Full Copy](#), page 176
  - [Dual Redundancy During Failback](#), page 176
  - [Failsafe Lock Management](#), page 176
  - [Link Failure Management](#), page 177
  - [Remote Copy Set Member Failures](#), page 177
  - [Remote Copy Set World Wide LUN ID](#), page 177
  - [Write History Logging](#), page 177
  - [Component Failures](#), page 177
- [Failure Modes of a DT System in Normal Operation](#), page 179
  - [Failure at Target Site After Failover](#), page 180
- [Confirmation Message Instance Codes](#), page 181

## HSG80 Array Controller Operating Characteristics

The HSG80 array controller has certain characteristics that may become evident when used in a Data Replication Manager solution. The following sections will help you understand these characteristics and educate you on how to respond to them.

### Forced Errors Detected During Copy

A forced error is a data bit indicating that a corresponding logical data block contains unrecoverable data. If a read request from the initiator to the target encounters a forced error during a full copy, then the data in that block will be copied to the target and marked with a forced error. These forced errors are then reported to the host and reappear each time the block is read. The file containing the forced error should be restored from a known good backup.

Refer to the *HP StorageWorks HSG80 Array Controller ACS V8.7 Maintenance and Service Guide* for complete details on how to recover from a forced error situation.

### Read Errors Detected During Full Copy

During normal operation, when a read error is detected, an unrecoverable error is reported to the host. The offending block is re- vectored, and the new block is marked with a forced error. During a full copy, however, the handling is slightly different because the block that is unrecoverable may not be within normal file system space. Therefore, the controller will terminate the copy and report the event.

Unrecoverable read errors on the source member will terminate the copy and send a fault management report to the host. Refer to the *HP StorageWorks Data Replication Manager HSG80 ACS Version 8.7P Configuration User Guide* and to the *HP StorageWorks HSG80 Array Controller ACS V8.7 CLI Reference Guide* for more information on how to interpret these logs.

### Dual Redundancy During Failback

The failback sequence is a scheduled event based upon the configuration at the failback site. The HSG80 array controller requires that a viable dual-redundant subsystem be available before a failback can take place. Failback to a single-controller configuration is not supported.

### Failsafe Lock Management

If failsafe mode is set for a remote copy set, that set can become failsafe locked if a unit fails or the target becomes inaccessible.

If a unit fails at the target site, then the target is removed from the remote copy set, and the remote copy set is placed in a failsafe lock condition. Once the unit failure has been eliminated, you can re-add the target to the remote copy set that initiates a full copy.

If a dual-link failure occurs, the remote copy set is placed in a failsafe locked condition. The target remains a member of the remote copy set but is marked invalid. Once the link has been restored to the target, a full copy is initiated. Once completed, the failsafe locked condition is cleared.

If the initiator unit fails, the remote copy set goes into failsafe locked condition.



## Link Failure Management

When an initiator controller detects that the link to its target controller is unavailable, the initiating controller will restart. This causes all remote copy sets on the initiating controller to fail over to its dual-redundant partner controller. The restart of the initiator controller is an intended action and is not an indicator of a defective controller.

## Remote Copy Set Member Failures

While most remote copy set members will be based on protected storage, in the unlikely event of a remote copy set member failure the following operating characteristics should be understood:

- If a remote copy set target member fails, a write issued to that remote copy set will cause a write failure at the target. The target member is removed, and, if the remote copy set was in failsafe error mode, then the remote copy set will be put in failsafe lock condition. If you wish to continue operation at the initiator site, be sure to change the remote copy set error mode to normal before proceeding.
- If a remote copy set member at the initiator fails, the unit will become unavailable to the host. The target member of the remote copy set is not read/write accessible through the initiator controller. Recovery from this condition requires a failover to the target site.

## Remote Copy Set World Wide LUN ID

Remote copy sets are assigned a unique worldwide LUN ID (WWLID) that represents their specific LUN. The controller identifies a remote copy set by its WWLID and presents it to the target when a failover is executed for that unit. If the remote copy set is failed over to a target site, its WWLID will be transferred with that unit, even though it may not be consistent with the controller's worldwide ID or the IDs of the other units presented on the new controller. The remote copy set will not assume a new WWLID, regardless of those that have had a failover to the target site.

## Write History Logging

Once write history logging commences to a log unit, care must be taken when choosing to disable logging. Issuing the `SET AssociationSetName NOLOG_UNIT` command may incur a full copy operation on the remote copy set. For example, this may happen if the controller is logging updates for a remote copy set because the links to the target are down. If the log unit is disabled during this time, the controller cannot use the write history log to update the target when the links are restored, as some operations were not written to the log. Therefore, a full copy is initiated. Also, the log disk is no longer known to the controller.

## Component Failures

The service and maintenance of a Data Replication Manager solution is based on failure of subsystem components. When a component fails, you must determine the cause of the failure, the most appropriate workaround to eliminate down time, and the best course of action to resolve the problem.

## Failure Notification

It is important to understand the operation of the disaster-tolerant (DT) subsystem and the individual component error logging methods that are used to analyze failures on a DT subsystem. Each component within the DT subsystem provides error and failure information specific to the function being performed. The array controllers maintain and log specific information relevant to the operation and to the devices connected to both the host ports and device ports of the controllers. Events, errors, and failures related to a DT subsystem are provided to the host. Information is available from the HSG80 controller via the serial maintenance port.

With Data Replication Manager, fault management events that occur on the target controllers are “passed through” and reported on the initiator controllers. The initiator then reports these events to the host via Template 90 (Data Replication Manager Services Event Sense Data Response). Refer to the *HP StorageWorks HSG80 Array Controller ACS V8.7 Maintenance and Service Guide* for more information.

## SWCC Failure

SWCC notifies the user of any component loss in the system via an active SWCC Client Graphical User Interface (GUI). This GUI window on the command console monitor is a graphical representation of the controllers and their physical and logical storage elements. SWCC periodically queries the controllers for status. Clients connected to the *GUI.ini* file will be notified via the GUI screen of any changes in status. The user can manipulate controllers and storage through the GUI and can intervene in the DT process when there is a problem.

Refer to the *HP StorageWorks Command Console User Guide* and the online user help for more information.

## Failure of One Member in a Dual-Redundant Controller Pair

In a dual-redundant setup, each of the controller pairs can lose a single member to failure. When this happens, a normal controller failover occurs automatically, and the preferred devices will automatically be moved to the remaining controller. A decrease in I/O speed may occur. The faulty controller must be replaced using conventional controller troubleshooting techniques.

---

**Note:** It is not possible to set up a DT configuration unless both controllers are operational.

---

## Failure Modes of a DT System in Normal Operation

Table 4 details the failure modes of a DT system operating in normal mode. While this table concentrates on the major failure possibilities, keep in mind that there are several other combinations that may occur. In most cases, when there is a loss of a major component, a failover is necessary to continue operation.

**Table 4: Failure Modes of a DT System with Normal Operation**

| Initiator Host | Target Host | Initiator Switch A | Initiator Switch B | Target Switch A | Target Switch B | Initiator Controller A | Initiator Controller B | Target Controller A | Target Controller B | Failure Mode<br><br>Loss of: | Action                                                            |
|----------------|-------------|--------------------|--------------------|-----------------|-----------------|------------------------|------------------------|---------------------|---------------------|------------------------------|-------------------------------------------------------------------|
| X              |             |                    |                    |                 |                 |                        |                        |                     |                     | Applications                 | Failover; repair host                                             |
|                | X           |                    |                    |                 |                 |                        |                        |                     |                     | Remote host                  | Repair host                                                       |
| X              | X           |                    |                    |                 |                 |                        |                        |                     |                     | Both sites                   | Failover not possible; repair hosts                               |
|                |             | X                  |                    |                 |                 |                        |                        |                     |                     | Data path                    | Repair switch                                                     |
|                |             |                    | X                  |                 |                 |                        |                        |                     |                     | Data path                    | Repair switch                                                     |
|                |             |                    |                    | X               |                 |                        |                        |                     |                     | Data path                    | Repair switch                                                     |
|                |             |                    |                    |                 | X               |                        |                        |                     |                     | Data path                    | Repair switch                                                     |
|                |             | X                  | X                  |                 |                 |                        |                        |                     |                     | Data access                  | Failover; repair switches                                         |
|                |             |                    |                    | X               | X               |                        |                        |                     |                     | Remote copy set targets      | Repair switches; target member must incur mini-merge or full copy |
|                |             | X                  |                    | X               |                 |                        |                        |                     |                     | Data path                    | Repair switches                                                   |
|                |             |                    |                    |                 |                 | X                      |                        |                     |                     | Data path                    | Repair controller                                                 |
|                |             |                    |                    |                 |                 |                        | X                      |                     |                     | Data path                    | Repair controller                                                 |
|                |             |                    |                    |                 |                 |                        |                        | X                   |                     | Data path                    | Repair controller                                                 |
|                |             |                    |                    |                 |                 |                        |                        |                     | X                   | Data path                    | Repair controller                                                 |
|                |             |                    |                    |                 |                 | X                      | X                      |                     |                     | Data access                  | Failover                                                          |
|                |             |                    |                    |                 |                 |                        |                        | X                   | X                   | Remote copy set targets      | Repair controllers; normalize remote copy sets                    |
|                |             |                    |                    |                 |                 | X                      |                        | X                   |                     | Data path                    | Repair controllers                                                |

## Failure at Target Site After Failover

After a failover has occurred, failures at the target site are detected in the same way as in a non-disaster tolerant state. [Table 5](#) shows the possible failure modes at the target site, assuming that the initiator site is not available to failback to.

**Table 5: Target Site DT Failure Modes After Failover**

| Target Host | Target Top Switch | Target Bottom Switch | Target Controller A | Target Controller B | Failure Mode<br>Loss Of | Action              |
|-------------|-------------------|----------------------|---------------------|---------------------|-------------------------|---------------------|
| X           |                   |                      |                     |                     | Remote site             | Repair host         |
|             | X                 |                      |                     |                     | Data path               | Repair switch       |
|             |                   | X                    |                     |                     | Data path               | Repair switch       |
|             | X                 | X                    |                     |                     | Data access             | Repair switches     |
|             |                   |                      | X                   |                     | Data path               | Repair controller   |
|             |                   |                      |                     | X                   | Data path               | Repair controller   |
|             |                   |                      | X                   | X                   | Data access             | Replace controllers |

## Confirmation Message Instance Codes

Use [Table 6](#) as a guide in interpreting the instance codes in your confirmation messages. You can also find more information about these codes in the *HP StorageWorks HSG80 Array Controller Version 8.7 Troubleshooting Reference Guide*.

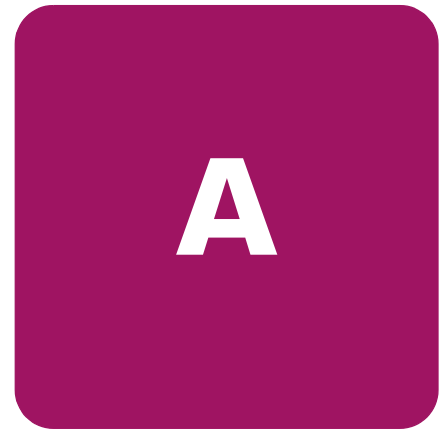
**Table 6: Instance Code Legend**

| Instance Code | What It Means                                                                                                                                                                                                                                                            |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 02908901      | The host command failed because the remote copy set went failsafe locked prior to command completion. The remote copy set is specified by the Remote Copy Name field. The Information field of the Device Sense Data contains the block number of the first block error. |
| 07050064      | Failover Control received a Last Gasp message from the other controller. The other controller is expected to restart within a given time period. If the other controller does not, the other controller will be held reset with the "Kill" line.                         |
| 43010064      | Host Port Protocol component has detected that the other controller has failed and that this controller has taken over the units specified in the extended sense data.                                                                                                   |
| 0258000A      | This command was aborted prior to completion. The Information field of the Device Sense Data contains the block number of the first block in error.                                                                                                                      |
| 0E010064      | A remote copy set has been created specified by the Remote Copy Set Name field. The initiator unit of the remote copy set is specified by the initiator WWLID field.                                                                                                     |
| 0E020064      | The remote copy set specified by the Remote Copy Set Name field has been deleted by the operator.                                                                                                                                                                        |
| 0E030064      | The logical unit specified by the target WWLID has transitioned from the normalizing or copying state to the normal state.                                                                                                                                               |
| 0E078A01      | The logical unit specified by the target WWLID has been removed from the remote copy set specified by the Remote Copy Set Name field. The target was removed by the operator.                                                                                            |
| 0E088864      | The remote copy set specified by the Remote Copy Set Name field has just had a membership change such that disaster tolerance failsafe error mode can now be enabled if desired.                                                                                         |
| 0E098901      | The remote copy set specified by the Remote Copy Set Name field has gone inoperative due to a disaster tolerance failsafe locked condition.                                                                                                                              |
| 0E0F8B01      | The copy was terminated due to a write failure on the target unit. The write failure was due to the links being down (target inaccessible). The copy will restart when at least one link is restored. The initiator unit is specified by the Initiator WWLID field.      |
| 0E110064      | The logical unit specified by the target WWLID field has transitioned from the merging state to the normal state.                                                                                                                                                        |
| 0E120064      | The copy was terminated due to a write failure on the target unit. The write failure was due to the links being down (target inaccessible). The copy will restart when at least one link is restored. The initiator unit is specified by the Initiator WWLID field.      |
| 0E210064      | The logical unit specified by the target WWLID field has transitioned from the normal state to the write history logging state due to a remote connection event (the target controllers are no longer accessible) or CLI SUSPEND command.                                |

**Table 6: Instance Code Legend (Continued)**

| Instance Code | What It Means                                                                                                                                                                                                               |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0E220064      | The logical unit specified by the target WWLID field has transitioned from the logging state to the merging state due to a remote connection event (the target controllers are no longer accessible) or CLI RESUME command. |
| 0E050064      | The logical unit specified by the target WWLID field has been added to the remote copy set specified by the Remote Copy Set Name field. The new target member is now in the normalizing state.                              |

# Status Comparison



This appendix describes the procedure for comparing the status of:

- Controllers
- Association sets
- Remote copy sets
- Units
- Connections

Performing a status comparison consists of the following procedures:

- Target Site Terminal Emulator Session
- Issuing SHOW Commands

HP recommends that you update your configuration records often as changes are made to the operational versions, and that you keep a copy of the results of your status comparisons at each site for ready reference.

## Target Site Terminal Emulator Session

1. Using a serial cable, connect the COM port of a laptop computer or another computer to the corresponding serial port on the HSG80 controllers.
2. Start a terminal emulator session that is capable of capturing text to a file (which will later be saved as step 6 of the Issuing SHOW Commands procedure). Use the following settings: 9600 baud, 8 bits, no parity, 1 stop bit, XON/XOFF.

## Issuing SHOW Commands

1. To see the full information on this controller, issue the following CLI command:

```
SHOW THIS_CONTROLLER FULL
```

You will see a display similar to that shown in [Example Display 1](#).

2. To see the information for all association sets known to the controller pair, issue the following CLI command:

```
SHOW ASSOCIATIONS FULL
```

You will see a display similar to that of [Example Display 2](#) for each association set.

3. To see information for all remote copy sets known to the controller pair, issue the following CLI command:

```
SHOW REMOTE_COPY_SETS FULL
```

You will see a display similar to that in [Example Display 3](#) for each remote copy set.

4. To see information for all units configured to the controller, issue the following CLI command:

```
SHOW UNITS FULL
```

You will see a display similar to that of [Example Display 4](#) for each unit.

5. To see the connection name, operating system, controller, controller port, adapter ID address, online or offline status, and unit offset, issue the following CLI command:

```
SHOW CONNECTIONS
```

You will see a display similar to that of [Example Display 5](#) for each connection.

6. Save for future reference the file started during the Terminal Emulator Session procedure. This file will contain the text captured throughout the above steps 1-5.

[Example Display 1](#) shows a sample output from the `SHOW THIS_CONTROLLER FULL` command:

### Example Display 1

```
Controller:
HSG80 ZG91412410 Software V85P, Hardware E05
NODE_ID      = nnnnnnnnnnnn
ALLOCATION_CLASS = 0
SCSI_VERSION  = SCSI-2
Configured for MULTIBUS_FAILOVER with ZG91416136
  In dual-redundant configuration
Device Port SCSI address 6
Time: NOT SET
Command Console LUN is lun 0 (NOIDENTIFIER)

Host PORT_1:
Reported PORT_ID = 5000-1FE1-0001-3AE1
PORT_1_TOPOLOGY = FABRIC (fabric up)
Address         = 220113

Host PORT_2:
Reported PORT_ID = 5000-1FE1-0001-3AE2
PORT_2_TOPOLOGY = FABRIC (fabric up)
Address         = 220313
REMOTE_COPY     = BuildingB

Cache:
256 megabyte write cache, version 0012
Cache is GOOD
No unflushed data in cache
CACHE_FLUSH_TIMER = DEFAULT (10 seconds)

Mirrored Cache:
256 megabyte write cache, version 0012
```



```

Cache is GOOD
No unflushed data in cache

Battery:
NOUPS
FULLY CHARGED
Expires:

Extended information:
Terminal speed 9600 baud, eight bit, no parity, 1 stop bit
Operation control: 00000000 Security state code: 75184
Configuration backup disabled

```

[Example Display 2](#) shows a sample output from the `SHOW ASSOCIATIONS FULL` command:

## Example Display 2

| Name | Association | Uses              | Used by |
|------|-------------|-------------------|---------|
| AS1  | association | RC1<br>RC2<br>RC3 |         |

```

Switches:
NOFAIL_ALL
NOORDER_ALL
NOLOG_UNIT

```

[Example Display 3](#) shows a sample output from the `SHOW REMOTE_COPY_SETS FULL` command:

## Example Display 3

| Name |             | Uses | Used by |
|------|-------------|------|---------|
| RC1  | remote copy | D1   | AS1     |

```

Reported LUN ID: nnnnnnnnnnnnnnnnnnn
Switches:
OPERATION_MODE = SYNCHRONOUS
ERROR_MODE     = NORMAL
FAILOVER_MODE  = MANUAL
OUTSTANDING_IOS = 60
.
.
.

```

[Example Display 4](#) shows a sample output from the `SHOW UNITS FULL` command:

## Example Display 4

|    |           |               |
|----|-----------|---------------|
| D2 | DISK10100 | BuildingB\RC2 |
|----|-----------|---------------|

```

LUN ID: nnnnnnnnnnnnnnnnnnnnnnnnn
NOIDENTIFIER
Switches:
RUN NOWRITE_PROTECT READ_CACHE
READAHEAD_CACHE WRITEBACK_CACHE
MAXIMUM_CACHED_TRANSFER_SIZE = 1
Access:
BuildngAA, BuildngAB, BuildngAC, BuildngAD, HostCon_1, HostCon_2
State:
ONLINE to this controller
Not reserved
PREFERRED_PATH = OTHER_CONTROLLER
Target NORMAL
Size: 17769177 blocks
Geometry (C/H/S): ( 5258 / 20 / 169 )

```

[Example Display 5](#) shows a sample output from the `SHOW CONNECTIONS` command:

Example Display 5

| Connection |                                                             |            |      | Unit    |         |        |
|------------|-------------------------------------------------------------|------------|------|---------|---------|--------|
| Name       | Operating system                                            | Controller | Port | Address | Status  | Offset |
| !NEWCON28  | WINNT                                                       | THIS       | 1    | 634000  | OL this | 0      |
|            | HOST_ID=1000-0000-C921-4B5B ADAPTER_ID=1000-0000-C921-4B5B. |            |      |         |         |        |

# DRM Power-Up and Power-Down



This appendix describes the procedure for powering up and powering down your DRM systems.

## Power-Up Data Replication Manager Systems

The procedures below describe how to power on and power off the storage subsystem after it has been configured.



**Caution:** Power up the controllers and switches at the target site before applying power to the initiator site. Powering up in the wrong sequence may cause incorrect configurations.

Power on the Data Replication Manager systems in the sequence shown in the following procedures.

### Target Site Power-Up Procedure

1. Ensure that all enclosures, switches, and rack power distribution units (PDUs) have their power switches in the Off position.
2. Apply power to all PDUs.
3. Turn on the power switches for the racks from the target site.
4. Ensure that all controllers are on and functional.
5. Apply power to all Fibre Channel switches.

### Initiator Site Power-Up Procedure

1. Ensure that all enclosures, switches, and rack PDUs have their power switches in the Off position.
2. Apply power to all PDUs.
3. Turn on the power switches for the racks from the initiator site.
4. Ensure that all controllers are on and functional.
5. Apply power to all Fibre Channel switches.

## Power Down DRM Systems

Power down the DRM systems in the sequence shown in the following procedures. If the initiator site will be powered down for a long period of time, you may need to disable cache batteries.

### Initiator Site Power-Down Procedure

1. Issue the following CLI commands (in this order):

```
SHUTDOWN OTHER_CONTROLLER
```

```
SHUTDOWN THIS_CONTROLLER
```

2. Turn off the Fibre Channel switches.
3. Turn off the power to the enclosures.
4. Turn off the PDUs.

### Target Site Power-Down Procedure

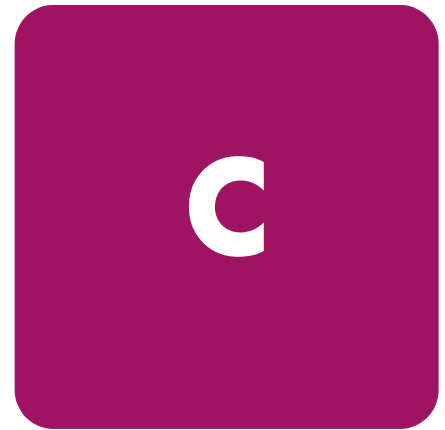
1. Issue the following CLI commands (in this order):

```
SHUTDOWN OTHER_CONTROLLER
```

```
SHUTDOWN THIS_CONTROLLER
```

2. Turn off the Fibre Channel switches.
3. Turn off the power to the enclosures.
4. Turn off the PDUs.

# Creating a Log Unit and Association Sets



This appendix describes the procedures to:

- [Create a Log Unit](#), page 189
- [Create Association Sets and Assign a Log Unit](#), page 190

## Create a Log Unit

1. Create a mirrorset for the log disk by issuing the following CLI command:

```
ADD MIRRORSETS MirrorsetName DiskName1 DiskName2
```

Example: `add mirrorsets mir_d1log disk50100 disk60100`

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

To minimize the number of devices used for logging, you can create and use one-member mirrorsets. Because the data is written to one disk, the logged data will not be protected. However, all of this data is also written to the initiator unit. In the case of a log disk failure, you would incur a full normalization, rather than a mini-merge, when access to the target is re-established.

The command to create a one-member mirrorset is the same as above, except only one disk is listed.

Example: `add mirr mir_d1log disk50100`

---

2. Initialize the mirrorset with the following CLI command:

```
INITIALIZE ContainerName
```

Example: `initialize mir_d1log`

3. Verify that you have created a mirrorset by issuing the following CLI command:

```
SHOW MIRRORSET
```

You will see a display similar to that in [Example Display 1](#).

### Example Display 1

| Name      | StorageSet | Uses                   | Used by |
|-----------|------------|------------------------|---------|
| MIR_D1LOG | mirrorset  | DISK50100<br>DISK60100 |         |

4. Present the log unit to the controller with the following CLI command:

```
ADD UNIT UnitName ContainerName
```

Example: add unit d10 mir\_d1log

5. Verify that the controller recognizes the log unit by issuing the following CLI command:

```
SHOW UNITS
```

You will see a display similar to that in [Example Display 2](#).

### Example Display 2

| LUN | Uses      | Used by |
|-----|-----------|---------|
| D10 | MIR_D1LOG |         |

## Create Association Sets and Assign a Log Unit

---

**Note:** If you will be using scripting to automate failover and failback operations, do not use dashes (hyphens) as separators in your naming convention (remote copy sets, stripesets, mirrorsets, RAIDsets, association sets, and connections)—use underscores instead. Dashes are not allowed by the Perl scripting language.

---

1. Create an association set with the following CLI command:

```
ADD ASSOCIATIONS AssociationSetName RemoteCopySetName
```

Example: add associations as\_d1 rcs1

Repeat this step for each association set.

---

**Note:** You can add additional members to the association set by issuing the following CLI command:

```
Set AssociationSetName ADD = RemoteCopySetName
```

Example: set as\_d1 add = rcs1

Repeat for each association set name.

---

2. Disable node access to the log unit with the following CLI command:

```
SET UnitNumber DISABLE_ACCESS_PATH = ALL
```

Example: set d10 disable\_access\_path = all

3. Disable writeback cache on log units with the following CLI command:

```
SET UnitNumber NOWRITEBACK_CACHE
```

Example: set d10 nowriteback\_cache

4. Check to see that you have disabled access and writeback cache with the following command:

```
SHOW D10
```

You will see a display similar to that in [Example Display 3](#).

### Example Display 3

| LUN                                             | Uses              | Used by    |
|-------------------------------------------------|-------------------|------------|
| D10                                             | MIR_D1LOG         |            |
| LUN ID: 6000-1FE1-0001-3B10-0009-9130-8044-0066 |                   |            |
| IDENTIFIER = 10                                 |                   |            |
| Switches:                                       |                   |            |
| RUN                                             | NOWRITE PROTECT   | READ_CACHE |
| READAHEAD_CACHE                                 | NOWRITEBACK_CACHE |            |
| MAXIMUM_CACHED_TRANSFER_SIZE = 32               |                   |            |
| Access:                                         |                   |            |
| None                                            |                   |            |
| State:                                          |                   |            |
| ONLINE to this controller                       |                   |            |
| Not reserved                                    |                   |            |
| PREFERRED_PATH = THIS_CONTROLLER                |                   |            |
| Size: 35556389 blocks                           |                   |            |
| Geometry (C/H/S): ( 7000 / 20 / 254 )           |                   |            |

5. Assign the log units to the association sets with the following CLI command:

```
SET AssociationSetName LOG_UNIT = D10
```

Example: set as\_d1 log\_unit = d10

6. Check to see the switch status of the association set by issuing the following CLI command:

```
SHOW ASSOCIATIONS FULL
```

You will see a display similar to [Example Display 4](#).

### Example Display 4

```
BuildngBTop> show associations full
```

| Name                            | Association | Uses | Used by |
|---------------------------------|-------------|------|---------|
| AS_D1                           | association | RCS1 |         |
| Switches:                       |             |      |         |
| NOFAIL_ALL                      |             |      |         |
| NOORDER_ALL                     |             |      |         |
| LOG_UNIT = D10 (No data logged) |             |      |         |

Repeat this step for each association set.





## Glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

### **ACS**

An acronym for array controller software. *See* array controller software.

### **adapter**

A hardware device that converts the protocol and hardware interface of one bus type to another without changing the function of either bus.

### **AL\_PA**

or

### **ALPA**

An acronym for Arbitrated Loop Physical Address. A two-digit hexadecimal number that expresses a port's physical position on the loop. ALPA numbers are normally not assigned in sequence (i.e., position 1 is not ALPA 1, and so on). A table in the Fibre Channel Standard equates the loop position to the default ALPA.

### **arbitrated loop**

A Fibre Channel topology. The basic definition is a ring of ports where the transmit output of one port is attached to the receive input of the next. Each port has a unique loop address and it talks to other ports on the loop by arbitrating for loop access. Loop addresses are assigned via cooperative port intercommunication during loop initialization, which occurs any time the device configuration on the loop is physically changed. PLDA (private loop direct attach), the specific profile implemented by the controller, is a subset of arbitrated loop.

*See also* PL\_DA or PLDA.

### **array controller**

*See* controller.

### **array controller software (ACS)**

Software that is contained on a removable PCMCIA program card that provides the operating environment for the array controller.

### **association sets**

An association set is a group of remote copy sets that share common attributes. Members of an association set are configured to transition to the same state at the same time. An association set:

- Shares the same log unit
- Has its host access removed from all members when one member fails
- Keeps I/O order across all members
- Fails over to the alternate controller in the event of primary controller failure.

CLI commands available are ADD ASSOCIATIONS and SET associations.

**asynchronous mode**

A mode of operation of the remote copy set whereby the write operation provides command completion to the host after the data is safe on the initiating controller, and prior to the completion of the target command.

Asynchronous mode can provide faster response time, but the data on all members at any one point in time cannot be assumed to be identical.

*See also* synchronous mode.

**ATM**

Asynchronous Transfer Mode. ATM refers to a network or communications technology used in LANs and WANs to enable disparate traffic (data, voice, and video) to be carried over the same local or wide area network. ATM is the transfer mode of choice for broadband integrated services digital networks (BISDNs). ATM traffic carries information in fixed-size cells.

**autospare**

A controller feature that automatically replaces a failed disk drive with a working drive. The operator can enable the AUTOSPARE switch for the failedset, causing physically replaced disk drives to be automatically placed into the spareset. Data recovery is outside the scope of autosparing. Also called *autonewspare*.

**B-series switches**

Fibre Channel core and SAN switches made by Brocade and sold by HP.

**bad block**

A disk drive data block that contains a physical defect.

**bad block replacement**

A replacement routine that substitutes defect-free disk blocks for those found to have defects. This process takes place in the controller, transparent to the host.

**BBR**

*See* bad block replacement.

**block**

A stream of data stored on disk or tape media and transferred and error-checked as a unit. In a disk drive, a block is also called a sector (the smallest collection of consecutive bytes addressable on a disk drive). In HP integrated storage elements, a block contains 512 bytes of data, error codes, flags, and the block address header.

**C-series switches**

Switches made by Cisco.

**cache**

A fast, temporary storage buffer in a controller or computer.

**cache memory**

Portion of high-speed memory used as an intermediary between a data user and a larger amount of storage. The objective of designing cache into a system is to improve performance by placing the most frequently used data in the highest performance memory and close to the process needing that data.

**CBR**

An acronym for Constant Bit Rate, a category of ATM service. This category supports a constant (guaranteed) data rate. CBR supports applications that require a highly predictable transmission rate.

**cascaded switch**

As applied to the Data Replication Manager, the term cascaded switch identifies that the output of a switch is connected to the input of another switch, which then may in turn be connected to another switch or host or controller.

**chunk**

A block of data written by the host.

*See also* block, chunk size.

**chunk size**

The number of data blocks, assigned by a system administrator, that are written to the primary RAIDset or stripeset member before the remaining data blocks are written to the next RAIDset or stripeset member. Non-default chunk size values must be exactly divisible by 8.

**CLI**

An acronym for command line interface. The CLI is the configuration interface to operate the controller software.

**clone**

A utility that physically duplicates data on any unpartitioned single-disk unit, stripeset, mirrorset, or striped mirrorset.

**command line interface**

See CLI.

**connection**

As applied to the Data Replication Manager, this refers to a connection between two-end Fibre Channel ports. An example would be the connection between a host bus adapter (by way of the Fibre Channel switches) and the HSG80 controller.

CLI commands available on the HSG80 are `ADD CONNECTIONS`, `SET connection_name`.

See also [link](#).

**container**

1. Any entity that is capable of storing data, whether it is a physical device or a group of physical devices.
2. A virtual internal controller structure representing either a single disk or a group of disk drives linked as a storageset. Examples of storageset containers that the controller uses to create units include stripesets and mirrorsets.

**controller**

A hardware device that uses software to facilitate communications between a host and one or more storage devices organized in an array. The HS-series *StorageWorks*™ family of controllers are all array controllers.

**copying member**

In a mirrorset, a copying member is a container introduced to the mirrorset after the mirrorset has already been in use. None of the blocks can be guaranteed to be the same as other members of the mirrorset. Therefore the *copying* member is made the same by copying all the data from a *normal* member. This is in contrast to *normalization*, where all blocks written since creation are known to be the same.

When all of the blocks on the copying member are the same as those on the normal member, the copying member becomes a normal member. Until it becomes a normal member, the copying member contains undefined data and is not useful for any purpose.

**DataSafe**

Also known as firewall for Microsoft Windows 2000 and NT. This pre-tested configuration uses specific hardware, Data Replication Manager software, and installation practices to protect operations from hardware or software outages. The solution includes No Single Point of Failure (NSPOF) functionality.

**default gateway**

The default path that a computer or router uses to forward and route data between two or more networks having different protocols.

**device**

See [node](#), peripheral device.

**disaster tolerance**

As applied to DRM, disaster tolerance provides the ability for rapid recovery of user data from a remote location when a significant event or a disaster occurs at the primary computing site.

*See also* remote copy sets, DT.

**DT**

An acronym for disaster tolerance.

*See* disaster tolerance.

**dual-redundant configuration**

A storage subsystem configuration consisting of two active controllers operating as a single controller. If one controller fails, the other controller assumes control of the failing controller's devices.

*See also* failover, failback.

**ECB**

An acronym for external cache battery.

*See* external cache battery.

**EMU**

Environmental Monitoring Unit. A device that provides increased protection against catastrophic failures. Some subsystem enclosures include an EMU, which works with the controller to detect conditions such as failed power supplies, failed blowers, elevated temperatures, and external air sense faults. The EMU also controls certain rack hardware, including alarms, fan speeds, and certain chips.

**environmental monitoring unit**

A piece of hardware that provides increased protection against catastrophic failures. Some subsystem enclosures include an EMU, which works with the controller to detect conditions such as failed power supplies, failed blowers, elevated temperatures, and external air sense faults. The EMU also controls certain rack hardware, including DOC chips, alarms, and fan speeds.

**external cache battery**

The unit that supplies backup power to the cache module in the event the primary power source fails or is interrupted.

**F\_port**

A port in a fabric where an N\_Port or NL\_Port may attach.

**fabric**

A network of Fibre Channel switches or hubs and other devices.

**failback**

The process of restoring data access to the newly restored controller in a dual-redundant controller configuration. The failback method (full copy or fast failback) is determined by the enabling of the Logging or Failsafe switches, the selected mode of operation (synchronous or asynchronous), and whether the failover is planned or unplanned.

*See also* failover, dual-redundant configuration.

**failedset**

A group of disk drives that have been removed from RAIDsets due to a failure or a manual action. Disk drives in the failedset should be considered defective and should be tested and repaired before being placed back into the spareset or back in their original locations.

**failover**

The process that takes place when storage processing is moved from one pair of controllers at one site to another pair at another site. Failover continues until the processing is failed back to the originator site.

The CLI command is: SITE\_FAILOVER

*See also* failback, dual-redundant configuration, planned failover.

**failsafe locked**

The failsafe error mode can be enabled by the user to fail any write I/O whenever the target is inaccessible or the initiator unit fails. When either of these conditions occurs, the remote copy set goes into the inoperative (offline) state and the failsafe error mode is *failsafe locked*.

The CLI command SET remote-copy-set-name ERROR\_MODE=FAILSAFE enables this error mode.

**fast failback**

A term representing the synchronization of the initiator site with the target during a planned failback from the target back to the initiator.

The write operations are logged to the target site write history log, and during the fast failback, the initiator site is updated from the write history log.

*See also* mini-merge, unplanned failover, planned failover, write history logging.

**FC-AL**

or

**FCAL**

An acronym for Fibre Channel Arbitrated Loop. FC-AL is the overall Fibre Channel topology whose basic definition is a ring of ports where the transmit outputs of one port are attached to the receive input of the next. Not supported by DRM.

**FCC**

An acronym for the Federal Communications Commission. The federal agency responsible for establishing standards and approving electronic devices within the United States.

**FCC Class A**

This certification label appears on electronic devices that can only be used in a commercial environment within the United States.

**FCC Class B**

This certification label appears on electronic devices that can be used in either a home or a commercial environment within the United States.

**FCP**

An acronym for Fibre Channel Protocol. The mapping of SCSI-3 operations to Fibre Channel.

**FDDI**

An acronym for Fiber Distributed Data Interface. An ANSI standard for 100 megabaud transmission over fiber optic cable.

**FD SCSI**

The fast, narrow, differential SCSI bus with an 8-bit data transfer rate of 10 MB/s.

*See* FWD SCSI and SCSI. More information is available from <http://www.t10.org>.

**fiber**

An optical strand used in fiber optic cable. Spelled fibre when used in “Fibre Channel” protocol.

*See also* fiber optic cable, Fibre Channel.

**fiber optic cable**

A transmission medium designed to transmit digital signals in the form of pulses of light. Fiber optic cable is noted for its properties of electrical isolation and resistance to electrostatic contamination. Available in three sizes: 50-micron multi-mode, 9-micron single-mode, and, in older installations, 62.5-micron multi-mode (not recommended for new installations).

**Fibre Channel**

An ANSI standard name given to a low-level protocol for a type of serial transmission. The Fibre Channel specifications define the physical link, the low level protocol, and all other pertinent characteristics.

**FL\_port**

A port in a fabric where N\_port or an NL\_port may be connected.

*See* N\_port, NL\_port, F\_Port.

*See also* fabric.

**firewall**

A generic term used to describe a limited DRM configuration consisting of only two switches. The maximum distance between any two components is 500 meters due to the short range GBICs.

*See also* DataSafe.

**frame**

A frame is the basic unit of communication using the Fibre Channel protocol. Each frame consists of a payload encapsulated in control information. The initiator breaks up the exchange into one or more sequences, which in turn are broken into one or more frames. The responder recombines the frames into sequences and exchanges.

*See also* initiator.

**FWD SCSI**

Acronym for fast, wide, differential (FWD) Small Computer System Interface (SCSI) bus with a 16-bit data transfer rate of up to 20 MB/sec.

*See also* FD SCSI and SCSI.

**GBIC**

An acronym for Gigabit Interface Converter. The hardware devices inserted into the ports of the Fibre Channel switch that hold the Fibre Channel cables. A GBIC converts fiber optic cable connections to Fibre Channel switch connections.

GBICs are available in three types: short wave, long wave, and very long distance. Short wave is limited to 50-micron multi-mode cable and 500 meters. Long wave uses 9-micron single-mode cable and is limited to a maximum distance of 10 kilometers. Very long distance also uses 9-micron low-loss cable and may extend to 100 kilometers.

**GLM**

Gigabit Link Module, used in short-wave multi-mode fiber only. GLMs, as a function of GBIC, are used in Fibre Channel long-distance applications. As applied to the Data Replication Manager, the GLMs provide the ability to increase the fiber optic cable transmission distances from 10 km to 70 km.

**hard address**

The AL\_PA or ALPA which an NL\_port attempts to acquire during loop initialization. Not used by DRM.

**heterogeneous host support**

Also called noncooperating host support. The ability to share storage between two similar (or dissimilar) hosts by way of storage partitioning.

**HIPPI-FC**

An acronym for the high-performance parallel interface (HIPPI) over the Fibre Channel. HIPPI is a media-level, point-to-point, 12-channel, full-duplex, electrical/optical interface. Not supported by DRM. *See* <http://www.t11.org> for more information.

**hop**

The definition of an interswitch connection. For example, there is one hop between two cascaded switches.

**ISL**

Intersite link or interswitch link. The abbreviation is context sensitive.

*See also* multiple intersite links.

**initiator**

1. A SCSI device that requests an I/O process to be performed by another SCSI device, namely, the SCSI target. The controller is the initiator on the device bus.
2. For subsystems using the disaster tolerance Data Replication Manager solution, the initiator is the site that is the primary source of information. In the event of a system outage, the data would be recovered from the target system.

*See also* target.

**IP address**

An abbreviation for Internet Protocol Address. The IP address is a number that is used as the address specifying a particular computer connected to the Internet.

**latency**

The amount of time required for a transmission to reach its destination.

**LBN**

An acronym for logical block number.

*See* logical block number.

**L\_port**

A node or fabric port capable of performing arbitrated loop functions and protocols. NL\_port and FL\_Port are loop-capable ports.

**link**

A physical connection between two adjacent Fibre Channel ports, consisting of a transmit fiber and a receive fiber. An example would be the connection between the Fibre Channel switch port and the HSG80 controller.

*See also* connection.

**local terminal**

A terminal plugged into the EIA-423 maintenance port on the front bezel of the HS array controller. Also called a maintenance terminal.

**Logical block number**

A volume-relative address of a block on a mass storage device. The blocks that form the volume are labeled sequentially starting with LBN 0.

**logical unit**

A physical or virtual device addressable through a target ID number. The logical unit numbers (LUNs) use their target's bus connection to communicate on the SCSI bus.

*See* LUN.

**logical unit number**

A value that identifies a specific logical unit belonging to a SCSI target ID number. A number associated with a physical device unit during a task's I/O operations. Each task in the system must establish its own correspondence between logical unit numbers and physical devices.

**LOG\_UNIT**

A CLI command switch that (when enabled) assigns a single, dedicated log unit for a particular association set. The association set members must all be in the NORMAL error mode (not failsafe).

*See also* write history logging.

**long distance mirroring**

Also known as peer-to-peer remote copy. *See also* remote copy sets.

**loop**

*See* arbitrated loop.

**loop\_ID**

A seven-bit value numbered contiguously from zero to 126-decimal, which represents the 127 legal AL\_PA or ALPA values on a loop (not all of the 256 hex values are allowed as AL\_PA values per FC-AL).

**loop tenancy**

The period of time between the following two events: when a port wins loop arbitration and when the port returns to a monitoring state.

**LUN**

An acronym for logical unit number.

*See* logical unit number.

**M-series switches**

Fibre Channel Director and Edge switches made by McDATA and sold by HP.

**mini-merge**

As applied to the Data Replication Manager, a term representing the data transfers to be made from the write history log when the target becomes available after having been unavailable. This happens when both links or both target controllers have gone down. The transfers that would have been made are instead logged into the association set's assigned log unit to wait until the remote copy set subsystem comes back online.

*See* fast failback, write history logging.

**mirroring**

The act of continuously creating an exact physical copy or image of data.

**mirrorset**

1. A group of storage devices organized as duplicate copies of each other. Mirrorsets provide the highest level of data availability at the highest cost. Another name for RAID 1. Also called mirrored units or mirrored virtual disks.
2. Two or more physical disks configured to present one highly reliable virtual unit to the host.
3. A virtual disk drive consisting of multiple physical disk drives, each of which contains a complete and independent copy of the entire virtual disk's data.

**multiple intersite links**

Each intersite link (ILS) is a fiber link between two switches. As applied to Data Replication Manager, increasing bandwidth between switches is handled by adding connections between the switches, to a maximum of two connections.

**N\_port**

A port attached to a node for use with point-to-point topology or fabric topology.

*See* point-to-point connection.

**NL\_port**

A port attached to a node for use in all three Fibre Channel topologies: point-to-point, arbitrated loop, and switched fabric.

**network**

In data communication, a configuration in which two or more terminals or devices are connected to enable information transfer.

**node**

1. In data communications, the point at which one or more functional units connect transmission lines.
2. In Fibre Channel, a device that has at least one N\_port or NL\_port.

**Non-L\_port**

A node or fabric port that is not capable of performing the arbitrated loop functions and protocols. N\_Ports and F\_Ports are loop-capable ports.



**nonparticipating mode**

A mode within an L\_Port that inhibits the port from participating in loop activities. L\_Ports in this mode continue to retransmit received transmission words but are not permitted to arbitrate or originate frames. An L\_Port in nonparticipating mode may or may not have an AL\_PA.

*See also* participating mode.

**non-RCS LUN**

As applied to Data Replication Manager, a logical unit number (LUN) value that identifies a physical device unit which exists at one of the two sites and does not have a mirror copy at the other site.

*See also* remote copy sets, LUN.

**normal member**

A mirrorset member that, block for block, contains exactly the same data as that on the other members within the mirrorset. Read requests from the host are always satisfied by normal members.

**normalizing**

A state in which, block for block, data written by the host to a mirrorset member is consistent with the data on other normal and normalizing members. The normalizing state exists only after a mirrorset is initialized. Therefore, no customer data is on the mirrorset.

**normalizing member**

A mirrorset member whose contents are the same as all other normal and normalizing members for data that has been written since the mirrorset was created or since lost cache data was cleared. A normalizing member is created by a normal member when either all of the normal members fail or all of the normal members are removed from the mirrorset.

*See also* copying member.

**OC-3**

An acronym for the optical carrier that provides high-speed bandwidth at 155.3 megabits per second.

**other controller**

The controller in a dual-redundant pair that is not connected to the controller serving your current CLI session with a local terminal.

*See also* this controller, local terminal.

**participating mode**

A mode within an L\_port that allows the port to participate in loop activities. A port must have a valid AL\_PA or ALPA to be in participating mode.

**PCM**

An acronym for Polycenter Console Manager.

**PCMCIA**

An acronym for Personal Computer Memory Card Industry Association. An international association formed to promote a common standard for PC card-based peripherals to be plugged into notebook computers. A PCMCIA card, sometimes called a PC Card, is about the size of a credit card. It is used in the HSG80 to load the controller software.

*See also* program card, ACS.

**PCR**

An acronym for peak cell rate, the maximum transmission speed of a virtual connection. PCR is a required parameter for the CBR service category.

**peer-to-peer remote copy**

*See* remote copy sets.

**peripheral device**

Any unit, distinct from the CPU and physical memory, that can provide the system with input or accept any output from it. Terminals, printers, tape drives, and disks are peripheral devices.

**planned failover**

As applied to the Data Replication Manager, an orderly shutdown of the initiator site applications and controllers for installation of new hardware, updating the software, and so on. The host applications are quiesced and all write operations are permitted to complete before the shutdown. The controllers must be in synchronous operation mode before starting a planned failover.

*See also* synchronous mode, unplanned failover.

**PL\_DA**

or

**PLDA**

An acronym for Private Loop Direct Attach. PLDA is a Fibre Channel profile, a proper subset of arbitrated loop. The PLDA profile (part of the Fibre Channel Standard), defines a specific way to implement arbitrated loop topology. Not supported by DRM.

*See* arbitrated loop.

**point-to-point connection**

A network configuration in which a connection is established between two, and only two, terminal installations. The connection may include switching facilities.

*See* N\_port.

**port**

- In general terms, a port is:

1. A logical channel in a communications system.
2. The hardware and software used to connect a host controller to a communications bus, such as a SCSI bus or serial bus.

- Regarding the controller, the port is:

1. The logical route for data in and out of a controller that can contain one or more channels, all of which contain the same type of data.
2. The hardware and software that connect a controller to a SCSI device.

**port\_name**

A 64-bit unique identifier assigned to each Fibre Channel port. The port\_name is communicated during the logon and port discovery process.

**preferred address**

The AL\_PA which an NL\_Port attempts to acquire first during initialization.

**private NL\_port**

An NL\_Port which does not attempt login with the fabric and only communicates with NL\_Ports on the same loop. Not used by DRM.

**public NL\_port**

An NL\_port that attempts login with the fabric and can observe the rules of either public or private loop behavior. A public NL\_Port may communicate with both private and public NL\_Ports. Not used by DRM.

**program card**

The PCMCIA card containing the controller's operating software.

*See also* PCMCIA.

**PTL**

An acronym for Port-Target-LUN. The controller's method of locating a device on the controller device bus:

- P designates the port (1—6)
- T designates the target ID of the device (1—6 in a non-redundant configuration, or 0—5 in a dual-redundant configuration)
- L designates the LUN of the devices (0—7).

**PVA module**

An abbreviation for Power Verification and Addressing module. The Ultra SCSI RAID enclosure assembly whose primary functions are to: (1) allow the user to select the enclosure Ultra SCSI bus ID; (2) enable the user to place the subsystem in a standby condition and return it to an operational status; and (3) in conjunction with the associated EMU, ensures that the major Ultra SCSI elements are functioning properly and notifies the user and the controller of error or fault conditions.

**PVC**

An acronym for Permanent Virtual Circuit. PVC is a logical connection manually defined by the network administrator. The PVC is created by specifying the VPI and VCI.

**quiesce**

To make a bus inactive or dormant. In a DRM environment, quiesce means to shut down or freeze applications such that all pending I/O is completed and no new I/O is initiated by the application until a thaw or unquiesce command is issued. During a device warm swap, the SCSI bus must quiesce.

*See also* planned failover.

**QoS**

An acronym for Quality of Service in an ATM network. Each virtual connection in an ATM network is set to a service category. The performance of the connection is measured by the established QoS parameters (outlined by the ATM Forum).

Performance issues include data rate, cell loss rate, cell delay, and delay variation (jitter).

Categories of ATM service are:

- Constant Bit Rate (CBR)
- Variable Bit Rate-Real Time (VBR-RT)
- Variable Bit Rate- Non-Real Time (VBR-NRT)
- Available Bit Rate (ABR)
- Unspecified Bit Rate (UBR)

*See* ATM.

**RCS**

*See* remote copy sets.

**redundancy**

The provision of multiple interchangeable components to perform a single function in order to cope with failures and errors. A RAIDset is considered to be redundant when user data is recorded directly to one member, and all of the other members and associated parity also are recorded. If a member is missing from the RAIDset, its data can be regenerated as needed, but the RAIDset is no longer redundant until the missing member is replaced and reconstructed.

**remote copy sets**

A feature that allows data to be copied (mirrored) from the originating site (initiator) to a remote site (target). The result is a mirror copy of the data (remote copy set) at two disparate sites. Used in disaster tolerance (DT) applications such as the Data Replication Manager.

CLI commands available are: ADD REMOTE\_COPY\_SETS, SET remote-copy-set-name, SET controller REMOTE\_COPY.

*See also* disaster tolerance, non-RCS LUN.

**remote copy set metadata**

Remote copy set metadata describes the remote copy set membership and state. To assist with site failover, this metadata is located in the mirrored write-back cache on the controller where each member resides. Backup copies of the metadata reside in the controller NVRAM at each site. Only the initiator modifies the metadata and ensures all copies are subsequently updated.

**replacement policy**

The policy specified by a CLI command switch (SET FAILEDSET command) indicating whether a failed disk from a mirrorset or RAIDset is to be automatically replaced with a disk from the spareset. The two switch choices are AUTOSPARE and NOAUTOSPARE.

**SCSI**

An acronym for Small Computer System Interface:

1. An American National Standards Institute (ANSI) interface standard defining the physical and electrical parameters of a parallel I/O bus used to connect initiators to devices.
2. A processor-independent standard protocol for system-level interfacing between a computer and intelligent devices, including hard drives, floppy disks, CD-ROMs, printers, scanners, and others.

Refer to <http://www.t10.org> for more information.

**SCSI device**

1. A host computer adapter, a peripheral controller, or an intelligent peripheral that can be attached to the SCSI bus.
2. Any physical unit that can communicate on a SCSI bus.

**SCSI device ID number**

A bit-significant representation of the SCSI address referring to one of the signal lines, numbered 0 through 7 for an 8-bit bus, or 0 through 15 for a 16-bit bus.

**SCSI ID number**

The representation of the SCSI address that refers to one of the signal lines numbered 0 through 15.

**snapshot**

A snapshot unit is one that reflects the contents of another unit at a particular point in time. It is a virtual copy and not a physical copy of the source device at a point in time.

*See also* unit.

**storage array**

An integrated set of storage devices. Storage arrays can be manipulated as one unit.

**storage unit**

The general term that refers to storagesets, single-disk units, and all other storage devices that are installed in a subsystem and accessed by the host. A storage unit can be any entity that is capable of storing data, whether it is a physical device or a group of physical devices.

**storageset**

1. A group of devices configured with RAID techniques to operate as a single container.
2. Any collection of containers, such as stripesets, mirrorsets, striped mirrorsets, JBODs, and RAIDsets.

**subnet mask**

Also known as address mask. A subnet is an IP network that can be reached through a single IP address. All the members of the subnet share the mask value. Members of the subnet can then be referenced more easily. A subnetwork is a network that is part of another network, connected through a gateway, bridge, or router.

**surviving controller**

The controller in a dual-redundant configuration pair that serves its companion's devices when the companion controller fails.

**SWCC**

An acronym for StorageWorks Command Console.

**synchronous mode**

A mode of operation of the remote copy set whereby the data is written simultaneously to the cache of the initiator subsystem and the cache of the target subsystem. The I/O completion status is not sent until all members of the remote copy set are updated.

*See also* asynchronous mode.

**target**

A SCSI device that performs an operation requested by another SCSI device, namely the SCSI initiator. The target number is determined by the device's address on its SCSI bus.

For subsystems using the disaster-tolerant Data Replication Manager solution, data processing occurs at the initiator site and the data is replicated or mirrored to the target site. In the event of a system outage, the data is recovered from the target system.

*See also* initiator.

**this controller**

The controller that is serving the current CLI session through a local or remote terminal.

*See also* other controller.

**UBR**

An acronym for unspecified bit rate. The UBR is a category of ATM service that supports connections that have no specified performance requirements.

**ULP**

An acronym for Upper Layer Protocol.

**ULP process**

A function executing within a Fibre Channel node which conforms to the Upper Layer Protocol (ULP) requirements when interacting with other ULP processes.

**UltraNet Wizard**

Another term for the Fibre Channel-to-ATM Configuration Wizard. This wizard is an UltraNet application that allows the designation of the default configuration settings for Fibre-Channel-ATM on the Open Systems Gateway.

**unit**

A container made accessible to a host. A unit may be created from a single disk drive or tape drive. A unit may also be created from a more complex container, such as a RAIDset. The controller supports a maximum of eight units on each target.

**unplanned failover**

As applied to the Data Replication Manager, an unplanned outage of the initiator site controllers. This may occur when the site communication is lost, or due to some other failure whereby remote copy sets cannot be implemented. The controllers do not perform an orderly shutdown.

*See also* planned failover.

**VCI**

An acronym for virtual channel identifier. The VCI is the field of the ATM cell header that stores the virtual channel address.

**VPI**

An acronym for virtual path identifier. The VCI is the field of the ATM cell header that stores the virtual path address.

**World Wide Name**

or

**World wide ID**

Also known by the acronym WWN. A unique 64-bit number assigned to a subsystem by the Institute of Electrical and Electronics Engineers (IEEE) and set by manufacturing prior to shipping. This name is referred to as the node ID within the CLI.

**write history logging**

As applied to the Data Replication Manager, the use of a log unit to log a history of write commands and data from the host. Write history logging is used for mini-merge and fast- failback.

*See* mini-merge, fast failback.

**WTI Switch**

An abbreviation for the Western Telematic Switch that must be installed to set up and service the ATM gateway. The WTI switch is a 16-port serial switch that is used to configure or service the OSG unit locally or remotely.

**zone**

A set of devices that access one another. All devices connected to a fabric may be configured into one or more zones. Devices that are in the same zone can see each other; devices that are in different zones cannot.

**zone alias**

Zone aliases simplify the entry of repetitive port numbers or World Wide Names. A zone alias is a C-style name for one or more port numbers or World Wide Names (e.g., the named host could be used as an alias for 10:00:00:60:69:00:00:8a).

**zone configuration**

A set of zones. At any one time zoning may be disabled or one zone configuration may be in effect. When a zone configuration is in effect, all zones that are members of that configuration are in effect. You select which zone configuration is currently in effect.

**zoning**

As applied to the Data Replication Manager, an optionally licensed feature of HP SAN switches that allows a finer segmentation of storage area networks (SANs) by allowing ports or WWN addresses to be used to confine access to devices that are in a common zone.

# index

!NEWCONxx connections, renaming to previous names [152](#)

## A

- adding back initiator unit to remote copy sets at initiator site [50](#), [55](#), [118](#)
- adding back initiator unit to remote copy sets at target site [36](#), [103](#), [145](#)
- adding new unit protected by new remote copy set [128](#)
- allowing hosts to recognize new units at initiator site [44](#), [155](#)
- allowing hosts to recognize new units at target site [29](#), [72](#), [98](#), [128](#), [167](#)
- allowing write history log to merge [75](#)
- application action list [21](#)
- assigning log unit to association set [68](#), [84](#), [191](#)
- association sets
  - creating [67](#), [84](#), [190](#)
  - deleting at initiator site [35](#), [62](#), [88](#), [91](#), [159](#)
  - deleting at target site [76](#), [150](#)
- asynchronous operation mode [36](#), [42](#), [61](#), [78](#), [91](#), [103](#), [106](#), [110](#), [152](#), [159](#), [164](#)
- asynchronous transfer mode [14](#)
- audience [8](#)
- authorized reseller, HP [12](#)

## B

- beginning a failback or failover too soon [15](#)
- breaking connection between sites [24](#)
- bus
  - Fibre Channel [22](#)

## C

- changing from asynchronous to synchronous mode at initiator site [61](#), [91](#), [159](#)
- changing from asynchronous to synchronous mode at target site [106](#)

- changing from synchronous to asynchronous mode at initiator site [42](#), [78](#), [110](#), [152](#)
- changing from synchronous to asynchronous mode at target site [36](#), [103](#), [164](#)
- checksum
  - location [133](#)
  - setting [133](#)
- clearing lost data at initiator site [32](#), [101](#)
- COM port [183](#)
- command line interpreter (CLI) commands
  - using in case of scripting problems [21](#)
- Command Scriptor [22](#)
- component
  - failures [177](#)
  - repair vs. failover [16](#)
- configuration file [21](#)
- connections
  - remote copy set [92](#), [160](#)
  - restoring to target site [35](#), [41](#), [65](#), [95](#), [108](#), [151](#), [163](#)
- connections to original controllers
  - deleting at initiator site [140](#)
- control table [22](#)
- controller
  - failure of one dual redundant member [178](#)
  - forced errors during copy [176](#)
  - operating characteristics [176](#)
  - read errors during copy [176](#)
- controller access
  - disconnecting at initiator site [39](#), [106](#), [147](#)
  - disconnecting at target site [64](#), [94](#), [123](#), [162](#)
- controller failover vs. site failover [15](#)
- controller prompt
  - designating [134](#)
- conventions
  - document [9](#)
  - equipment symbols [10](#)
  - text symbols [9](#)
- creating a log unit [66](#), [189](#)
- creating a mirrorset [66](#), [82](#), [189](#)

creating association sets [67](#), [84](#), [190](#)

## D

data

mirrored [14](#)

Data Replication Manager

basic configuration diagram [15](#)

component failures [177](#)

overview [14](#)

deleting association sets at initiator site [35](#), [62](#), [88](#), [91](#), [159](#)

deleting association sets at target site [76](#), [150](#)

deleting connections to original controllers at initiator site [140](#)

deleting remote copy sets at initiator site [35](#), [102](#)

deleting remote copy sets at target site [40](#), [107](#), [150](#)

designating controller prompt [134](#)

determining which controller the remote copy set LUN is online to [54](#)

disabling host access to remote copy set units at initiator site [34](#), [62](#), [91](#), [136](#), [159](#)

disabling host access to remote copy set units at target site [38](#), [75](#), [105](#), [146](#), [170](#)

disabling initiator controller access to remote copy sets at target site [139](#)

disabling node access to log unit [190](#)

disabling node access to log unit at initiator site [83](#)

disabling node access to log unit at target site [67](#)

disabling write history logging at target site [40](#), [76](#), [107](#), [149](#), [170](#)

disabling writeback cache [190](#)

disabling writeback cache at initiator site [83](#)

disabling writeback cache at target site [67](#)

disaster tolerance

failure modes in normal operation [179](#)

disaster tolerant (DT) [14](#)

failure notification [178](#)

disaster-tolerant (DT) [178](#)

disconnecting controller access at initiator site [39](#), [106](#), [147](#)

disconnecting controller access at target site [64](#), [94](#), [123](#), [162](#)

document

conventions [9](#)

related documentation [8](#)

DRM hardware [18](#)

DRM Scripting Kit [21](#)

dual redundancy

failure of one member [178](#)

dual-link failure [176](#)

## E

enabling access to initiator site host [173](#)

enabling access to original initiator site host [79](#)

enabling host access to remote copy set units at initiator site [154](#)

enabling host access to remote copy set units at target site [27](#), [69](#), [97](#), [125](#), [165](#)

enabling host access to remote copy units at initiator site [43](#), [110](#)

enabling initiator controller access to remote copy set units at target site [144](#)

enabling port 1 & 2 connections to fabric [138](#)

enabling remote copy set unit access to target site controllers [63](#)

enabling target controller access to remote copy set units at initiator site [143](#)

equipment symbols [10](#)

error messages

*error-initiator unit specified not found* [143](#)

error-initiator unit specified not found. [142](#)

Error\_Mode = Failsafe [16](#)

Error\_Mode = Normal [16](#)

establishing connection to target site [143](#)

establishing connections to initiator site [142](#)

event log [23](#)

extended duration site maintenance [19](#)

extended planned loss  
resumption of replication [19](#)

## F

failback

dual redundancy [176](#)

full [18](#)

resuming [38](#), [146](#)

failing back initiator role to initiator site [107](#)

failing over remote copy sets [25](#), [124](#)

failover

failure at target site after failover [180](#)

planned failover [60](#)

unplanned [15](#), [18](#), [19](#), [24](#)

unplanned with full failback [23](#)

when to [16](#)

failover and failback [14](#)

failover event

loss of intersite connections [19](#)

failover scenarios [17](#)

failover vs. component repair [16](#)

failsafe

failsafe lock management [176](#)

failsafe mode

remote copy sets [176](#)

setting at initiator site [42](#), [51](#), [79](#), [110](#), [152](#)

setting at target site [38](#)

failsafe-locked mode [17](#)

failures

at target site after failover [180](#)



- component 177
- dual-link 176
- network 179
- notification 178
- StorageWorks Command Console 178
- types 16
- fast failback
  - after planned site failover 75
  - initiator site cleanup 77
  - target site failback 75
- Fibre Channel bus 22
- Fibre Channel switches 14
- forced errors 176
- full failback
  - after unplanned site failover 18
  - initiator site preparation 32, 101
  - initiator site restoration of target connections 41, 108
  - initiator site return control 39, 106
  - target site copy data 35, 103, 105
  - target site restore 40, 107
- full normalization vs. merge 66, 189
- G**
  - getting help 12
  - GUI.ini file 178
- H**
  - hardware
    - DRM 18
    - redundancy 14
  - help, obtaining 12
  - host access to to remote copy units
    - enabling at initiator site 43, 110, 154
  - host I/O
    - resuming at initiator site 49
  - HP
    - authorized reseller 12
    - storage web site 12
    - technical support 12
  - hyphens in naming convention 22
- I**
  - I/O performance at initiator site
    - enhancing 77, 171
  - I/O performance at target site
    - enhancing 28, 68, 97, 127, 154, 165
  - initializing a mirrorset 66, 83, 189
  - initiator controller access
    - disabling access to at target site 139
  - initiator controllers
    - shutting down 93
  - initiator host name
    - recalling 34
  - initiator role
    - failing back to initiator site 107
    - moving to target controller 65
    - moving to target site 95, 162
  - initiator site
    - establishing connections to 142
    - failure modes in normal operation 179
  - initiator site cleanup 77
  - initiator site connections 143
  - initiator site host
    - enabling access to 173
  - initiator site preparation 32, 60, 90, 101, 158
  - initiator site procedure steps identification 23
  - initiator site restoration of target connections 41, 108, 151
  - initiator site return control 39, 106, 147
  - initiator unit
    - adding back to remote copy sets at initiator site 50, 55, 118
    - adding back to remote copy sets at target site 36, 103, 145
  - initiator vs. target 15
  - initiators
    - multiple 14
  - instance code
    - comparing screen with example display 23
- L**
  - leaving load running at target site 38
  - link failure management 177
  - log disk failure
    - full normalization vs. merge 66, 189
  - log unit
    - assigning to association set 68, 84, 191
    - creating 66, 189
    - presenting to controller 67, 83, 190
  - logged data
    - protection 66, 189
  - loss of initiator site
    - unplanned 23
  - loss of intersite connections 19
  - loss of target
    - unplanned 18
  - lost data
    - clearing at initiator site 32, 101
- M**
  - maintenance completion 101
  - maintenance failback 105
  - maximum cached transfer size
    - setting 171

- setting at initiator site [34](#), [43](#), [63](#), [77](#), [93](#), [111](#), [138](#), [160](#), [171](#)
- setting at target site [28](#), [40](#), [68](#), [76](#), [97](#), [108](#), [127](#), [150](#), [154](#), [165](#)
- mirroring of data [14](#)
- mirrorset
  - creating [66](#), [82](#), [189](#)
  - initializing [66](#), [83](#), [189](#)
  - one-member [66](#), [189](#)
- moving initiator role to target controller [65](#)
- moving initiator role to target site [95](#), [162](#)
- moving initiator role to the original initiator [39](#), [148](#)
- moving remote copy sets control to original initiator [76](#)
- multi-host environment
  - failure [17](#)
- multiple initiator subsystems [14](#)

## N

- naming convention
  - use of hyphens [22](#)
- new hardware failback [132](#)
  - initiator site connections [143](#)
  - initiator site preparation [132](#)
  - initiator site restoration of target connections [151](#)
  - initiator site return control [147](#)
  - target site copy data [144](#)
  - target site preparation [139](#)
  - target site restore [149](#)
- new unit protected by new remote copy set
  - adding [128](#)
- new units
  - allowing hosts to recognize at initiator site [44](#), [155](#)
  - allowing hosts to recognize at target site [29](#), [72](#), [98](#), [128](#), [167](#)
- node
  - disabling access to at initiator site [83](#)
  - disabling access to log unit [190](#)
  - disabling access to log unit at target site [67](#)
- node ID
  - location [133](#)
  - setting [133](#)
- non-catastrophic failures [14](#)
- normal error mode [16](#)
- normal mode [17](#)
- normalization completion percentage
  - viewing normalization completion percentage at initiator site [50](#), [56](#), [104](#), [118](#), [146](#), [164](#)
  - viewing normalization completion percentage at target site [37](#), [103](#)

## O

- one-member mirrorset [66](#), [189](#)

- operating systems
  - setting connections back to [153](#)
- operating system-specific steps at initiator site [33](#), [44](#), [61](#), [79](#), [90](#), [111](#), [132](#), [155](#), [158](#), [173](#)
- operating system-specific steps at target site [29](#), [72](#), [98](#), [128](#), [155](#), [167](#)
- overview
  - Data Replication Manager [14](#)

## P

- peer-to-peer remote copy [14](#)
- Perl interpreter [21](#)
- Perl programming language [21](#)
- planned failover
  - initiator site preparation [60](#), [90](#)
  - maintenance completion [101](#)
  - target host setup [68](#), [97](#)
  - target site failover [63](#), [93](#)
- planned failover vs. unplanned failover [15](#)
- planned role reversal [19](#)
- port 1 & 2
  - enabling connections to fabric [138](#)
- power distribution unit (PDU) [187](#)
- power down DRM systems [188](#)
- power up DRM systems [187](#)
- preferred path
  - setting at initiator site [137](#)
  - setting at target site [25](#), [63](#), [93](#), [123](#), [161](#)
- preferred SCSI mode
  - setting controller to [134](#)
- preparing remote copy sets [116](#)
- presenting log unit to controller [67](#), [83](#), [190](#)
- procedure choices
  - summary [20](#)
- protected storage [177](#)
- protection of logged data [66](#), [189](#)

## R

- rack stability, warning [11](#)
- read errors [176](#)
- recalling initiator host name [34](#)
- recalling target host name [27](#), [70](#), [97](#), [126](#), [165](#)
- redundancy
  - hardware [14](#)
- re-enabling failsafe mode at initiator site [42](#), [79](#), [110](#), [152](#)
- related documentation [8](#)
- remote copy set connections [92](#), [160](#)
- remote copy set LUN
  - determining which controller it is online to [54](#)
  - removing [54](#)
- remote copy set unit units
  - connections [62](#)

- remote copy set units
  - disabling host access to at initiator site 34, 62, 91, 136, 159
  - disabling host access to at target site 38, 75, 105, 146, 170
  - enabling access to target site controllers 63
  - enabling target controller access to at initiator site 143
- remote copy sets
  - asynchronous operation mode 36, 42, 61, 78, 91, 103, 106, 110, 152, 159, 164
  - deleting at initiator site 35, 102
  - deleting at target site 40, 107, 150
  - enabling host access at target site 27, 69, 97, 125, 165
  - enabling initiator controller access at target site 144
  - failing over 25
  - failsafe mode 176
  - member failure 177
  - moving control to original initiator 76
  - peer-to-peer copy function 14
  - synchronous operation mode 36, 42, 61, 78, 91, 103, 106, 110, 152, 159, 164
  - worldwide LUN ID 177
- removing remote copy set LUN 54
- removing targets at initiator site 49, 116
- removing targets at target site 26, 95, 125
- renaming !NEWCONxx connections to previous names 152
- restoring connections to target site 35, 41, 65, 95, 108, 151, 163
- resuming failback 38, 146
- resuming host I/O at initiator site 49
- resuming operations after loss of target
  - resumption of host access to remote copy sets 49, 54
  - resumption of operations and return to failsafe mode 50
  - verification of lost connections 48, 54
  - verification of resumption of operations 55
- resuming remote copy sets 86
- resuming write operations to target site 86
- resumption of availability 117
- resumption of host access to remote copy sets 49, 54
- resumption of operations and return to failsafe mode 50
- resumption of replication 19
- resumption of replication after extended planned loss of target
  - preparing remote copy sets 116
  - resume remote copy set operation 117
  - resumption of availability 117

- resumption of replication after short planned loss of target
  - resuming remote copy sets 86
  - suspend remote copy sets for target site shutdown 82
  - target site shutdown 86
- role reversal
  - planned 19
  - recovery from disaster 20
- role reversal failback 170
  - initiator site cleanup 171
  - target site simple failback 170
- role reversal failover
  - initiator site preparation 158
  - target host setup 165
  - target site failover 161

## S

- Scripting User Guide 21
- scripts
  - available as a procedure 20
  - failover and failback 21
  - redundancy at initiator and target sites 21
- SCSI mode 134
- setting checksum 133
- setting connections to operating systems 153
- setting controller to preferred SCSI mode 134
- setting error mode of remote copy sets to normal at initiator site 82
- setting error mode to failsafe at initiator site 119
- setting failsafe for units in association set used for write history logging 38
- setting failsafe mode at initiator site 51
- setting failsafe mode at target site 38
- setting maximum cached transfer size 171
- setting maximum cached transfer size at initiator site 34, 43, 63, 93, 111, 138, 160
- setting maximum cached transfer size at target site 40, 108, 150
- setting node ID 133
- setting port 2 topology offline 24
- setting preferred path at initiator site 137
- setting preferred path at target site 25, 63, 93, 123, 161
- short duration planned outage at initiator site 59
- short duration site maintenance 18
- short planned loss of target
  - resumption of replication 19
- shutting down initiator controllers 93
- single component failure 16
- site failover 39, 124, 148
  - described 15
- site failover vs. controller failover 15
- site maintenance

- extended duration 19
- short duration 18
- status comparison
  - target site terminal emulator session 183
- StorageWorks Command Console
  - failure 178
- summary of procedure choices 20
- suspend remote copy sets for target site shutdown 82
- suspending write operations to target site 69, 85
- symbol
  - event log 23
- symbol for initiator site steps 23
- symbol for target site steps 23
- symbols in text 9
- symbols on equipment 10
- synchronous operation mode 36, 42, 61, 78, 91, 103, 106, 110, 152, 159, 164

## T

- target host name
  - recalling 27, 70, 97, 126, 165
- target host setup 68, 97, 165
- target site
  - establishing connection to 143
  - failure after failover 180
  - failure modes in normal operation 179
- target site copy data 35, 103, 105, 144
- target site failback 75
- target site failover 24, 63, 93, 122, 161
- target site preparation 139
- target site procedure steps identification 23
- target site restore 40, 107, 149
- target site shutdown 86
- target site terminal emulator session 183
- target sites
  - quantity per initiator site 14
- target vs. initiator 15
- targets
  - removing at initiator site 49, 116
  - removing at target site 26, 95, 125
- technical support, HP 12
- text symbols 9
- troubleshooting
  - component failures 177
  - dual redundancy during failback 176
  - failsafe lock management 176
  - failure at target site after failover 180
  - failure modes in normal operation 179
  - failure notification 178
  - failure of one dual redundant member 178
  - forced errors during copy 176

- link failure management 177
- network failure 179
- read errors during copy 176
- remote copy set failure 177
- remote copy set worldwide LUN ID 177
- StorageWorks Command Console failure 178
- turning off write history logging at initiator site 35, 61, 88, 91, 159
- types of failure 16

## U

- unplanned failover 122
  - target site failover 24, 122
- unplanned failover vs. planned failover 15
- unplanned loss of initiator 23
- unplanned loss of target 18
- unplanned loss of target due to failure of intersite links 47
- unplanned site failover 18, 19
- unplanned site failover with full failback 23

## V

- verification of lost connections 48, 54
- verification of resumption of operations 55

## W

- warning
  - rack stability 11
  - symbols on equipment 10
- web sites
  - DRM Scripting Kits 22
  - HP storage 12
- when to failover 16
- world wide LUN ID (WWLID) 177
  - for remote copy sets 177
- write history log
  - allowing to merge 75
- write history logging
  - disabling at target site 40, 76, 107, 149, 170
  - turning off at initiator site 35, 61, 88, 91, 159
- write operations
  - suspending to target site 69
- write operations to target site
  - resuming 86
  - suspending 85
- writeback cache
  - disabling 190
  - disabling at initiator site 83
  - disabling at target site 67